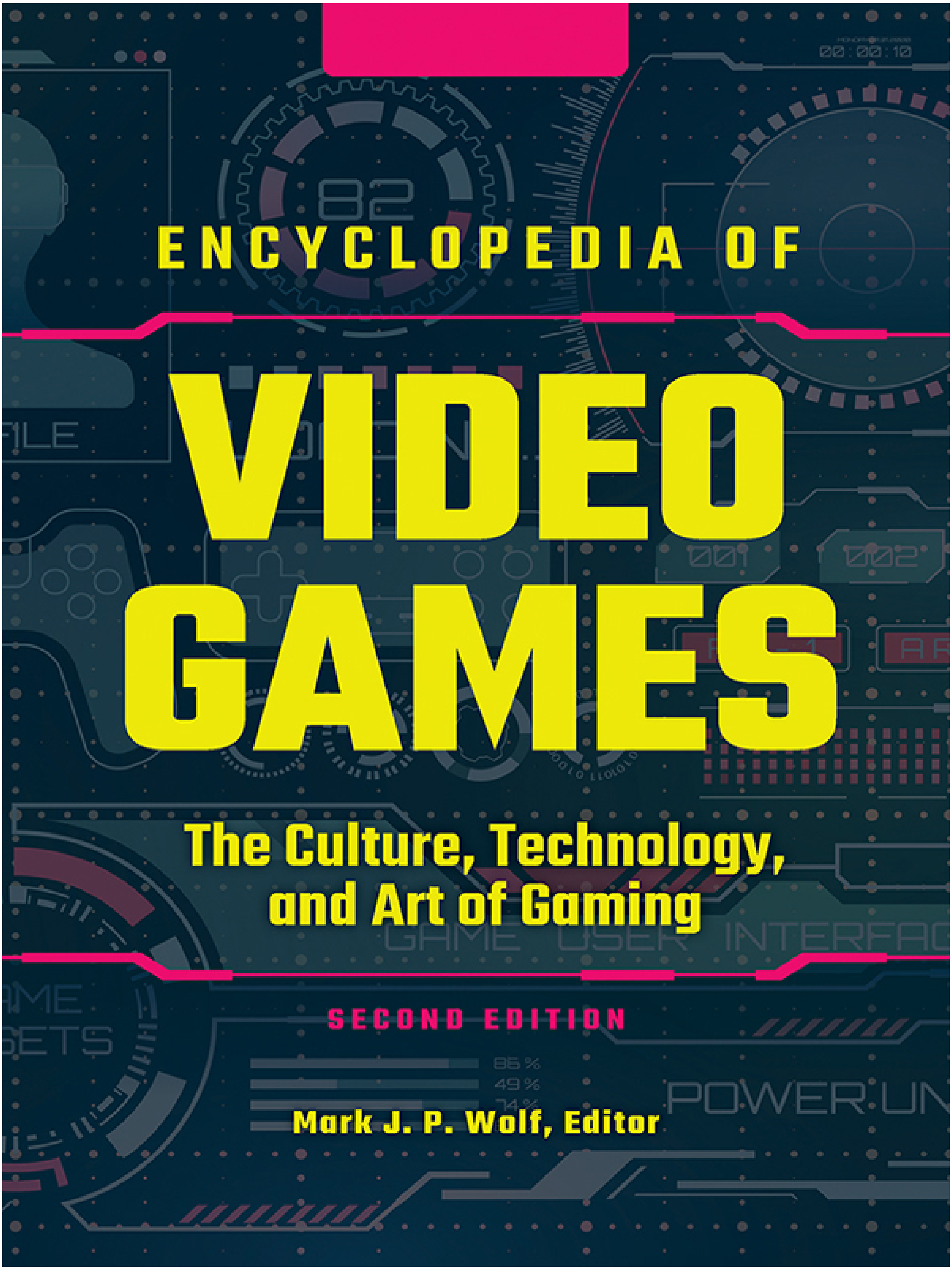

00:00:10
82
FILE
001
002
GAME USER INTERFAC
85%
49%
POWER UN

ENCYCLOPEDIA OF VIDEO GAMES

The Culture, Technology, and Art of Gaming

SECOND EDITION

Mark J. P. Wolf, Editor

Encyclopedia of Video Games

Encyclopedia of Video Games

THE CULTURE, TECHNOLOGY, AND ART OF GAMING

SECOND EDITION

VOLUME 1: A–F

Mark J. P. Wolf, Editor

GREENWOOD™
An Imprint of ABC-CLIO, LLC
Santa Barbara, California • Denver, Colorado

Copyright © 2021 by ABC-CLIO, LLC

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, except for the inclusion of brief quotations in a review, without prior permission in writing from the publisher.

Library of Congress Cataloging-in-Publication Data

Names: Wolf, Mark J. P., editor.
Title: Encyclopedia of video games : the culture, technology, and art of gaming / Mark J.P. Wolf, editor.
Description: Second edition. | Santa Barbara, California : ABC-CLIO, LLC, [2021] | Includes bibliographical references and index.
Identifiers: LCCN 2021007328 (print) | LCCN 2021007329 (ebook) | ISBN 9781440870194 (set) | ISBN 9781440878640 (v. 1 ; hardcover) | ISBN 9781440878657 (v. 2 ; hardcover) | ISBN 9781440878664 (v. 3 ; hardcover) | ISBN 9781440870200 (ebook)
Subjects: LCSH: Video games—Encyclopedias.
Classification: LCC GV1469.3 .E65 2021 (print) | LCC GV1469.3 (ebook) | DDC 794.803—dc23
LC record available at https://lccn.loc.gov/2021007328
LC ebook record available at https://lccn.loc.gov/2021007329

ISBN: 978-1-4408-7019-4 (set)
978-1-4408-7864-0 (vol. 1)
978-1-4408-7865-7 (vol. 2)
978-1-4408-7866-4 (vol. 3)
978-1-4408-7020-0 (ebook)

25 24 23 22 21 1 2 3 4 5

This book is also available as an eBook.

Greenwood
An Imprint of ABC-CLIO, LLC

ABC-CLIO, LLC
147 Castilian Drive
Santa Barbara, California 93117
www.abc-clio.com

This book is printed on acid-free paper ♾

Manufactured in the United States of America

Contents

List of Entries

Guide to Related Topics

Foreword to the Second Edition

Foreword to the First Edition

Preface

Acknowledgments

A–Z Entries

About the Editor and Contributors

Index

List of Entries

Abbas, Reine
Abstraction
Abzû
Accessibility
Activision
Activision Blizzard
Adaptation
Addiction
Adventure
Adventure Games
Advergames
Advertising
Affordances
Africa
Afroes
Angry Birds
Animal Crossing Series
Animation (Computer)
Animation (Hand-Drawn)
Apocalypse
Apple Bandai Pippin
Apps (Applications)
Arakawa, Minoru
Arcade Cabinet Art
Arcade Games
Arcades
Archives
Argentina
Art
Art, Video Games as
Artificial Intelligence
Asheron's Call

Association for UK Interactive Entertainment
Atari
Atari, Inc. v. North American Philips Consumer Electronics Corp.
Atari 5200
Atari Jaguar
Atari Lynx
Atari 7800 ProSystem
Atari VCS 2600
Audio (Dynamic, Interactive, and Adaptive)
Augmented Reality
Australia
Avatars
AY-3-8500 Chip
Baer, Ralph H.
Bailey, Dona
Ball-and-Paddle Games
Bally
Battlezone
“Beating” a Game
Bemani
Biomechanics
BioShock Series
Board Games
Boss Keys
Brazil
Brown v. Entertainment Merchants Association
Bulletin Board Systems
Bungie
Bushnell, Nolan
Caillois, Roger
Call of Duty Series
Canada
Candy Crush Saga
Capcom
Capcom USA v. Data East
Careers
Cartridges
Casual Games
CD-ROM-Based Games
Censorship
Cheating
Checkpoints
Chen, Jenova
Chile
China
Cinematronics
City of Mesquite v. Aladdin’s Castle, Inc.
Civic Engagement

Co-Creativity
Codemasters
Cognition
Coleco
ColecoVision
Collecting Video Games
Colombia
Comics
Computer Games
Computer Games Magazine
Computer Gaming World
Computer Space
Console-Based Games
Contemplative Games
Controllers
Conventions
Cooperative Gameplay
Cow Clicker
Crash of 1977
Crash of 1983
Crawford, Chris
Cuphead
Cutscenes
CVC GameLine Master Module
Cyan Worlds
Czech Republic
Dance Dance Revolution
Data East USA v. Epyx
Dating Sims
Death and Resurrection
DECO Cassette System
Defender
Deludic Play
Demoscenes
Denmark
Digital Games Research Association
Digital Games Research Center
Dimensionality
DOOM
Dual In-Line Parallel Switches
Duncan, Theresa
DVD and Blu-Ray Disc Games
Dystopian Games
Easter Eggs
Education (General)
Education (Job Training)
Education (Religious)
Egypt

Elder Scrolls, The Series
Electromechanical Games
Electronic Arts
Emotion
Emulators
Entertainment Software Association
Entertainment Software Rating Board
Environmentalism
Erikawa, Keiko
Esports
Europe (Central and Eastern)
Europe (Western)
EVE Online
EverQuest
Experimental Games
Failure
Fairchild/Zircon Channel F
Fallout Series
Fandom
FarmVille
Femininity
FIFA Series
Fighting Games
Film
Finland
“First” Video Game
First-Person Shooters
Football Games
Fortnite
France
Free-to-Play Model
Fullerton, Tracy
Galaxy Game
Gambling
Game, Definition of
Game Design
Game Developers Conference
Game Engines
Game Feel
Game Genealogies
Game Guides
Game Informer
Game Manuals
Game Modifications
Game Studies
Game Transfer Phenomena
Game Writing
Gamergate

Gamers Outreach Foundation
Games, Philosophical Critique of
Games and Culture
Games Done Quick
Gamification
Garriott, Richard
GCE/Milton Bradley Vectrex
Gender
Generations of Technology
Germany
Gestural Interfaces
Girls’ Games
Githuku-Shongwe, Anne
Glitches
Global Reach of Games
God Games
Gold Farming
Google Play (Portal)
Grand Theft Auto Series
Graphics
Hacking
Handheld Games
Hawkins, Trip
HDTV Games
Health (Mental)
Health (Physical)
Heineman, Rebecca
Help Function
Hip-Hop
History of Video Games
HoloLens
Homebrew Games
Hong Kong
Houser, Sam and Dan
HTC Vive
Huizinga, Johan
Hungary
I, Robot
Iceland
id Software
Idea for Home Video Games
Immersion
Immersion v. Sony
Incremental Games
India
Indonesia
Industry
Infocom

Interactive Movies
Interface
International Center for the History of Electronic Games
International Game Developers Association
Ireland
Italy
JAMMA Standard
Japan
Jensen, Jane
Jordan
Journalism
Joysticks
Killer List of Videogames
King of Fighters, The Series
Kirby Series
Kirschenbaum v. Electronic Arts
Kojima, Hideo
Konami
Language
Laserdisc Games
Latin America
Latinos and Video Games
Laurel, Brenda
Lebanon
Legend of Zelda, The Series
LEGO Video Games
Let’s Play Videos
Localization
Ludology
Machinima
Magic Circle
Magnavox Odyssey
Mainframe Games
MAME
Maps
Mario Kart Series
Mario Series
Masculinity
Massively Multiplayer Online Role-Playing Games
Mattel Intellivision
Maxis Software
McGonigal, Jane
Meier, Sid
Merchandising
Meridian 59
Metagames
Metal Gear Series
Metalepsis

Metaphor
Metatextuality
Metroid Series
Mexico
MicroProse
Microsoft Xbox
Microsoft Xbox One
Microsoft Xbox 360
Middle East
Midway Games
Midwest Gaming Classic
Military Use of Games
Minecraft
Minigames
Mixed Reality
Mobile Games
Molyneux, Peter
Morality and Ethics
Mortal Kombat
Motion Capture and Motion Control
Multiuser Domains
Museum of the Game
Music
Myst
Namco
Narrative
Navigation (Spatial)
Navigation (Temporal)
NCSoft
NEC PC-Engine/TurboGrafx-16
Neo•Geo
NetEase
Netherlands, The
New Zealand
Newsgames
Night Journey, The
Nintendo
Nintendo DS
Nintendo Entertainment System/Nintendo Famicom
Nintendo Game Boy
Nintendo GameCube
Nintendo 64
Nintendo Switch
Nintendo Virtual Boy
Nintendo v. Blockbuster Video
Nintendo Wii
Nintendo Wii U
Non-Player Characters

Norway
Oculus Rift
Online Games
Ontology
Open-Source Software
Oregon Trail, The
Outsourcing
OUYA
Overwatch
Packaging
Pac-Man
Pan European Game Information System
Paradox Interactive
Patent #2,455,992
PC Bangs
Performance
Peripherals
Persistent Games
Pervasive Games
Phenomenology
Philips CD-i
Piracy in China
Platforms
Play
Play Meter Magazine
Playrix
Pokémon GO
Poland
PONG
Portal Series
Portugal
Preservation
Procedural Generation
Procedural Rhetoric
Psychodynamics
Psychological Research on Video Games
*Q*bert*
Qix
Quick Time Events
Quraish
Race
Racing Games
Reading Video Game Imagery
Reception Theory
Reddy, Siobhan
Remediation
Replay and Repetition
RePlay Magazine

Representations of Video Games in Hollywood Cinema
Resident Evil Series
Resolution
Resource Management Games
Retrogaming
Rhetoric
Rhythm and Dance Games
Ritual
Riven
Rockstar Games
Rohrer, Jason
Role-Playing Games
Romania
Romero, Brenda
Ross, Bonnie
Rules
Russia
Santiago, Kellee
Saudi Arabia
Save Function
Scepter of Goth
Scrolling
SEGA
SEGA CD/Mega-CD
SEGA Dreamcast
SEGA Game Gear
SEGA Genesis/SEGA Mega Drive
SEGA Master System/SEGA Mark III
SEGA Saturn
Serious Games
Shareware Games
Shaw, Carol
Shooting Games
Sierra Entertainment
Silent Film
Silicon Knights v. Epic Games
Sim Series
Sims, The Series
Simulation Games
Singapore
SNK (Shin Nihon Kikaku) Playmore
Social Media
Sony Corporation
Sony PlayStation
Sony PlayStation 2
Sony PlayStation 3
Sony PlayStation 4
Sony v. Bleem

Sound
Sound Technology
South Africa
South Korea
Space (Narrative)
Space (Visual)
Space Invaders
Spacewar!
Spain
Spector, Warren
Speedruns
Spirituality
Sports Games
Square Enix
StarCraft
Stealth Games
Steam (Portal)
Strategy Games
Streaming
Street Fighter II
Strong National Museum of Play
Subcreation
Suicide Battery
Super Nintendo Entertainment System/Super Famicom
Supergiant Games
Survival Horror Games
Sustainability
Sweden
Switzerland
Syria
Television
Tempest
Tencent Holdings Ltd.
Tetris
Text Adventure Games
Thailand
thatgamecompany
3-D Hardware
3DO Interactive Multiplayer
Time
Tool-Assisted Superplay
Touchscreen Games
Treasure Co. Ltd.
Turkey
Twin Galaxies
Twitch
Ubiquitous Games
Ubisoft

Ultima Series
Unit Operations
United Arab Emirates
United Kingdom
United States of America
Universal City Studios, Inc. v. Nintendo Co. Ltd.
Unlockable Games
Unreal Engine
Uruguay
Vector Games
Vectorbeam
Video Game Literacy
Video Game Movies
Video Game Museums
Video Game Novels
Video Game Studies
Video Games and Literature
Video Games as Collectibles
Video Games within Video Games
Videotopia
Vintage Arcade Preservation Society
Violence
Virtual Pets
Virtual Reality
Visual Literacy
Visual Novels
Walden, a Game
Walkthroughs
War
Warnets
Web-Based Games
Weisbecker, Joyce
West and Zampella v. Activision
Wii Sports
Williams (Company)
Williams, Roberta
World (of a Video Game)
World Cyber Games
World of Warcraft
World Video Game Hall of Fame
World War II in Video Games
Wright, Will
XaviXPORT
Xbox Game Studios
Xiaobawang System
XNA
Yokoi, Gunpei
YouTube

Zapak (Portal)
Z-Axis Depth
Zaxxon
Zeebo
Zen Mode
Zynga Inc.

Guide to Related Topics

Associations and Institutions

Association for UK Interactive Entertainment (UKIE)
Digital Games Research Association (DiGRA)
Digital Games Research Center (DIGAREC)
Entertainment Software Association (ESA)
Entertainment Software Rating Board (ESRB)
Game Developers Conference (GDC)
Gamers Outreach Foundation
Games Done Quick (GDQ)
International Center for the History of Electronic Games (ICHEG)
International Game Developers Association (IGDA)
Killer List of Videogames (KLOV)
Midwest Gaming Classic (MGC)
Museum of the Game (MOG)
Pan European Game Information (PEGI) System
Strong National Museum of Play
Twin Galaxies
Video Game Museums
Videotopia
Vintage Arcade Preservation Society (VAPS)
World Cyber Games
World Video Game Hall of Fame

Business and Industry

Arcades
Archives
Atari, Inc. v. North American Philips Consumer Electronics Corp.

Brown v. Entertainment Merchants Association
Capcom USA v. Data East
Careers
City of Mesquite v. Aladdin's Castle, Inc.
Crash of 1977
Crash of 1983
Data East USA v. Epyx
Esports
Free-to-Play Model
Gambling
Gamergate
Gamification
Gold Farming
Immersion v. Sony
Industry
Kirschenbaum v. Electronic Arts
Localization
Merchandising
Nintendo v. Blockbuster Video
Outsourcing
Packaging
Patent #2,455,992
PC Bangs
Piracy in China
Preservation
Silicon Knights v. Epic Games
Sony v. Bleem
Sustainability
Universal City Studios, Inc. v. Nintendo Co. Ltd.
Warnets
West and Zampella v. Activision

Companies

Activision
Activision Blizzard
Afroes
Atari
Bally
Bemani
Bungie
Capcom
Cinematronics
Codemasters
Coleco
Cyan Worlds

Electronic Arts (EA)
Google Play (Portal)
id Software
Infocom
Konami
Maxis Software
MicroProse
Midway Games
Namco
NCSoft
NetEase
Nintendo
Paradox Interactive
Playrix
Rockstar Games
SEGA
Sierra Entertainment
SNK (Shin Nihon Kikaku) Playmore
Sony Corporation
Square Enix
Steam (Portal)
Supergiant Games
Tencent Holdings Ltd.
thatgamecompany
3DO Interactive Multiplayer
Treasure Co. Ltd.
Twitch
Ubisoft
Vectorbeam
Williams (Company)
YouTube
Zapak (Portal)
Zynga Inc.

Games

Abzû
Adventure
Angry Birds
Animal Crossing Series
Asheron's Call
Battlezone
BioShock Series
Call of Duty Series
Candy Crush Saga
Computer Space

Cow Clicker
Cuphead
Dance Dance Revolution (DDR)
Defender
DOOM
Elder Scrolls, The Series
EVE Online
EverQuest
Fallout Series
FarmVille
FIFA Series
Fortnite
Galaxy Game
Grand Theft Auto Series
I, Robot
King of Fighters, The Series
Kirby Series
Legend of Zelda, The Series
LEGO Video Games
Mario Kart Series
Mario Series
Meridian 59
Metal Gear Series
Metroid Series
Minecraft
Mortal Kombat
Myst
Night Journey, The
Oregon Trail, The
Overwatch
Pac-Man
Pokémon GO
PONG
Portal Series
*Q*bert*
Qix
Quraish
Resident Evil Series
Riven
Scepter of Goth
Sim Series
Sims, The Series
Space Invaders
Spacewar!
StarCraft
Street Fighter II
Tempest
Tetris

Ultima Series
Walden, a game
Wii Sports
World of Warcraft (WoW)
Zaxxon

Other Media

Animation (Computer)
Animation (Hand-Drawn)
Apps (Applications)
Arcade Cabinet Art
Art
Art, Video Games as
Augmented Reality (AR)
Board Games
Comics
Computer Games Magazine
Computer Gaming World
Electromechanical Games
Esports
Film
Game Informer
Game Studies
Games and Culture
Hip-Hop
Journalism
Let's Play Videos
Machinima
Mixed Reality (MR)
Music
Open-Source Software
Play Meter Magazine
Replay Magazine
Silent Film
Social Media
Streaming
Television
Video Game Literacy
Video Game Movies
Video Game Novels
Video Games within Video Games
Virtual Reality (VR)
YouTube

People

Abbas, Reine
Arakawa, Minoru
Baer, Ralph H.
Bailey, Dona
Bushnell, Nolan
Caillois, Roger
Chen, Jenova
Crawford, Chris
Duncan, Theresa
Erikawa, Keiko
Fullerton, Tracy
Garriott, Richard
Githuku-Shongwe, Anne
Hawkins, Trip
Heineman, Rebecca
Houser, Sam and Dan
Huizinga, Johan
Jensen, Jane
Kojima, Hideo
Laurel, Brenda
McGonigal, Jane
Meier, Sid
Molyneux, Peter
Reddy, Siobhan
Rohrer, Jason
Romero, Brenda
Ross, Bonnie
Santiago, Kellee
Shaw, Carol
Spector, Warren
Weisbecker, Joyce
Williams, Roberta
Wright, Will
Yokoi, Gunpei

Regions

Africa
Argentina
Australia
Brazil
Canada
China
Colombia

Czech Republic
Denmark
Egypt
Europe (Central and Eastern)
Europe (Western)
Finland
France
Germany
Hong Kong
Hungary
Iceland
India
Indonesia
Ireland
Italy
Japan
Jordan
Latin America
Lebanon
Mexico
Middle East
New Zealand
Netherlands, The
Norway
Poland
Portugal
Romania
Russia
Saudi Arabia
Singapore
South Africa
South Korea
Spain
Sweden
Switzerland
Syria
Thailand
Turkey
United Arab Emirates (UAE)
United Kingdom
United States of America
Uruguay

Systems

Apple Bandai Pippin

Atari 5200
Atari Jaguar
Atari Lynx
Atari 7800 ProSystem
Atari VCS 2600
ColecoVision
Fairchild/Zircon Channel F
GCE/Milton Bradley Vectrex
HoloLens
HTC Vive
Magnavox Odyssey
Mattel Intellivision
Microsoft Xbox
Microsoft Xbox One
Microsoft Xbox 360
NEC PC-Engine/Turbografx-16
Neo•Geo
Nintendo DS
Nintendo Entertainment System (NES)/Nintendo Famicom
Nintendo Game Boy
Nintendo GameCube
Nintendo 64
Nintendo Switch
Nintendo Virtual Boy
Nintendo Wii
Nintendo Wii U
Oculus Rift
OUYA
Philips CD-i
SEGA CD/Mega-CD
SEGA Dreamcast
SEGA Game Gear
SEGA Genesis/SEGA Mega Drive
SEGA Master System/SEGA Mark III
SEGA Saturn
Sony PlayStation
Sony PlayStation 2
Sony PlayStation 3
Sony PlayStation 4
Super Nintendo Entertainment System (SNES)/Super Famicom
XaviXPORT
Xiaobawang System
Zeebo

Technology

Artificial Intelligence (AI)
Audio (Dynamic, Interactive, and Adaptive)
Augmented Reality (AR)
AY-3-8500 Chip
Biomechanics
Boss Keys
Bulletin Board Systems (BBSs)
Cartridges
CD-ROM-Based Games
Checkpoints
CVC GameLine Master Module
DECO Cassette System
Dual In-Line Parallel (DIP) Switches
Easter Eggs
Electromechanical Games
Emulators
Game Design
Game Engines
Game Modifications
Generations of Technology
Gestural Interfaces
Glitches
Gold Farming
Graphics
Hacking
Help Function
Interface
JAMMA Standard
Joysticks
MAME
Mixed Reality (MR)
Motion Capture and Motion Control
Multiuser Domains (MUDs)
Open-Source Software
Peripherals
Platforms
Preservation
Procedural Generation
Quick Time Events (QTEs)
Resolution
Save Function
Scrolling
Sound Technology
Speedruns
Streaming
Suicide Battery
Sustainability
3-D Hardware

Tool-Assisted Superplay (TAS)
Touchscreen Games
Unreal Engine
Vector Games
Video Game Museums
Virtual Reality (VR)
XNA
Zen Mode

Theoretical Concerns

Abstraction
Accessibility
Adaptation
Addiction
Advertising
Affordances
Apocalypse
Arcades
Art
Art, Video Games as
Audio (Dynamic, Interactive, and Adaptive)
Augmented Reality (AR)
Avatars
"Beating" a Game
Biomechanics
Censorship
Cheating
Civic Engagement
Co-Creativity
Cognition
Collecting Video Games
Controllers
Conventions
Cooperative Gameplay
Cutscenes
Death and Resurrection
Deludic Play
Demoscenes
Dimensionality
Education (General)
Education (Job Training)
Education (Religious)
Emotion
Environmentalism
Failure

Fandom
Femininity
“First” Video Game
Game, Definition of
Game Design
Game Feel
Game Genealogies
Game Guides
Game Manuals
Game Modifications
Game Transfer Phenomena
Game Writing
Games, Philosophical Critique of
Gamification
Gender
Gestural Interfaces
Global Reach of Games
Graphics
Health (Mental)
Health (Physical)
Help Function
History of Video Games
Idea for Home Video Games
Immersion
Interface
Language
Latinos and Video Games
Ludology
Machinima
Magic Circle
Maps
Masculinity
Metagames
Metalepsis
Metaphor
Metatextuality
Military Use of Games
Mixed Reality (MR)
Morality and Ethics
Narrative
Navigation (Spatial)
Navigation (Temporal)
Non-Player Characters (NPCs)
Ontology
Performance
Phenomenology
Play
Procedural Rhetoric

Psychodynamics
Psychological Research on Video Games
Race
Reading Video Game Imagery
Reception Theory
Remediation
Replay and Repetition
Representations of Video Games in Hollywood Cinema
Retrogaming
Rhetoric
Ritual
Rules
Save Function
Sound
Space (Narrative)
Space (Visual)
Speedruns
Spirituality
Subcreation
Sustainability
Time
Unit Operations
Video Game Studies
Video Games as Collectibles
Violence
Virtual Reality (VR)
Visual Literacy
Walkthroughs
War
World (of a Video Game)
World War II in Video Games
Z-Axis Depth
Zen Mode

Types of Games

Adventure Games
Advergames
Arcade Games
Ball-and-Paddle Games
Board Games
Casual Games
CD-ROM-Based Games
Computer Games
Console-Based Games
Contemplative Games

Dating Sims
DVD and Blu-Ray Disc Games
Dystopian Games
Electromechanical Games
Esports
Experimental Games
Fighting Games
First-Person Shooters (FPSs)
Football Games
Girls’ Games
God Games
Handheld Games
HDTV Games
Homebrew Games
Incremental Games
Interactive Movies
Laserdisc Games
Mainframe Games
Massively Multiplayer Online Role-Playing Games (MMORPGs)
Minigames
Mobile Games
Newsgames
Online Games
Persistent Games
Pervasive Games
Racing Games
Resource Management Games
Rhythm and Dance Games
Role-Playing Games (RPGs)
Serious Games
Shareware Games
Shooting Games
Simulation Games
Sports Games
Stealth Games
Strategy Games
Survival Horror Games
Text Adventure Games
Touchscreen Games
Ubiquitous Games
Unlockable Games
Vector Games
Virtual Pets
Visual Novels
Web-Based Games

Foreword to the Second Edition

In the decade since the First Edition of this encyclopedia was published, the terrain of games and game culture has changed immeasurably. Much of that change has come along with the explosion of independent game making — independent, academic, amateur and otherwise— and with the increased diversity of game makers that have come along with that explosion. Access to tools, opportunity for experimentation, and increased visibility for game makers outside of the commercial mainstream has been a predominant theme of these past ten to fifteen years.

My own experience with this surge of independence began in 2002 when I left the commercial game industry to join the fledgling USC Games program and started to gather a community of young, idealistic game designers together at the Game Innovation Lab under the shared goal of expanding the cultural presence of games. We, and others like us, looked to inspirations such as the New Games Movement and the punk rock and indie art music scenes; and we dreamed of making games that touched the human soul and spoke truth to power. A number of the games we made, and the people who made them are part of this revised encyclopedia, and so it seems fitting in that regard that I have been asked to provide an introduction to this new edition.

In looking over the new entries for this edition, I am pleased to see some important trends reflected here. I see a whole group of women designers newly included: Dona Bailey, Brenda Romero, Kellee Santiago, Theresa Duncan, Roberta Williams, Carol Shaw, and more, including myself, are all afforded entries in this new edition. I see discussions of new genres of games: free-to-play, newsgames, metagames, Zen mode, etc. The recognition of "contemplative games" such as *Abzû*, *The Night Journey* and *Walden, a game*, strikes a particular chord for me, given my long-time work in the area. But I am equally excited to see entries for other emerging areas in games, such as eSports, Let's Play videos, and mixed reality; and for the capture of entries on historically important topics like *Brown v. Entertainment Merchants Association*, the collections at the Strong National Museum of Play, and even Gamergate—stain on the culture of games that it is. As an educator and a designer, I am thrilled to see discussions of video game literacy, ontology, and rhetoric included here. In the growth of the field and its expressive possibilities, engagement with such topics becomes critical to our deepening understanding of our field. And, as a classic gamer, I am satisfied to see topics on our history as well as our future, added here, such as discussions of arcade cabinet art, Konami, and *Zaxxon*.

The list of entries in this new edition is not comprehensive, of course, and never can be —not if we are to keep advancing the field and the people and ideas it encompasses. The universe of games is large, it contains multitudes, and so this new edition grows with that universe; but it cannot, and never should, fully comprehend it. It is up to us to continue to push past into the future of games, and to projects like this to recognize and historicize the work that we do as an industry and a community. It is my great honor to be a part of such a process.

Tracy Fullerton
Los Angeles, California
September 23, 2019

Foreword to the First Edition

I guess a book about video games needs a foreword about the context of the business at the beginning, and I guess that I am the guy who should write it.

I got my start on a late night at the Merrill Engineering Building at the University of Utah, where I was studying engineering. There were big computers connected to video screens, and whenever that happens someone uses them to play games. The game I saw was *Spacewar!* written by Steve Russell from MIT. I was hooked. For the whole next two years, we programmed more than 20 games for play on the system, spending hours from midnight to 5 a.m. every weekend. We did everything from a little car racing game to fox and geese, from a very bad football game to tennis and hockey.

The piece of the puzzle that made me unique among the thousands of students who played the game was that I was working summers at an amusement park. It was called Lagoon, and it was a half-hour drive north from Salt Lake City. I had become the games manager that year and knew the economics of the amusement business and made the connection immediately. If this game could be put in one of the arcades at the park, it would make money. Further analysis said that the computers were too costly to be paid for 25 cents at a time.

Fast forward a few years. I had graduated, moved to California, and was working at Ampex as an Associate Electrical Engineer. I was playing Go with a programmer working at the Stanford Artificial Intelligence lab at Stanford, and he asked me if I wanted to come up and play *Spacewar!* I was hooked again. But this time I was in a position where I could act on my interest. I saw an ad for a Data General Nova Computer for $5,000. The cost looked like it could work.

My office mate was Ted Dabney, and I asked him if he wanted to join my company and give this a try. He said yes, and we were off to the races.

The problem was that computer displays were vector graphic units modified from radar displays and cost about $30,000 at that time. What was needed was a cheap monitor. A TV could be purchased for about $100 at the time, and I decided that a digital interface was the right approach.

The design work started, and although we had not purchased the computer yet, we got all the technical specs and began the design. The computer was mind-numbingly slow. A TV wants data at 3 megabits per second. The computer had a clock speed of 800 Khz. We had to do many tricks to get the information to match. When we would run out of time, we would make the interface do more stuff in hardware.

Our epiphany came when we decided that we could do it all in hardware and not buy the computer at all. It was a big day. We got a blip on the screen in two weeks and turned it into a rocket ship in a month. We got a licensing deal with a local company called Nutting Associates that had been making a trivia coin-operated game, and in six months we had the game ready to ship. It was a wild ride. *Computer Space* was a modest success selling about 3,000 units. It was limited to locations around college campuses. It made a lot of money with a sophisticated customer base but did horribly in the bar with normal folks. Probably the best thing it did was convince us that we could go out on our own. We got some contracts for games, hired Al Alcorn, and made a business of video games.

Did we think the game business would get to be worth billions of dollars? Perhaps we all knew it would get big but were so busy making games and dealing with competition that there was actually little time for that type of speculation. The video game industry was born.

Nolan Bushnell
January 23, 2011

Preface

The year 2012, when the first edition of this encyclopedia was published, marked the fiftieth anniversary of video games, if one measures their existence from the completion of *Spacewar!* (1962), which is considered by many to be the first real video game, a claim that, naturally, involves defining the video game itself (see "First" Video Game). In its first half century, the video game went from being a technological trick created by hackers to an electronic novelty to a popular toy, American pastime, and media industry. More recently, it has become a social networking tool and object of academic study. The uses of video games have likewise expanded from mere entertainment to a tool for communication, education, physical exercise, job training, psychological experimentation, therapy, and more. When one considers their many uses, the great variety of games and game technologies, and the wide variety of scholarly approaches to studying them (ranging from media studies to art history and computer science, philosophy and psychology, education and economics, anthropology and politics, etc.), the time seems right for this expanded second edition, despite its appearance less than a decade after the first edition. Now in its second half century, the video game continues its rapid growth and spread throughout global culture; thus, the second edition of this encyclopedia appears in three volumes, with many new entries added and old entries updated and expanded.

With 518 updated entries (206 of them new to this edition) on a variety of topics, the second edition of the *Encyclopedia of Video Games* features the work of 186 contributors (90 of them new to this edition) from six continents, whose countries of origin include Argentina, Australia, Brazil, Canada, Chile, China, Colombia, the Czech Republic, Denmark, England, Finland, France, Germany, Hungary, India, Indonesia, Ireland, Italy, Kenya, Mexico, the Netherlands, New Zealand, Norway, Portugal, Romania, Russia, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, the United States, and Uruguay as well as Hong Kong. As a result, even more of the world could be covered in this edition than I was able to cover in the encyclopedia's first edition, and there are entries on several dozen countries and regions, including places that are rarely mentioned in North American video game scholarship, despite their rapidly growing video game industries.

Something should be said about the terminology used throughout this encyclopedia. Because of the nature of the coverage needed, *video games* is used in an inclusive sense and is the broadest of terms referring to the games discussed in these volumes. The term *computer games* is slightly narrower; it is reserved for games that use home computers (or mainframe computers) but not those found in dedicated console systems, even though those systems almost always contain a computer (generally speaking, the machines that play *computer games* can perform other computer functions apart from games). The terms *electronic games* and *digital games*, which are even broader in scope than *video games*, are not used because they include many games that do not utilize an imaging device and may not even have a visual display. A similar problem arises with *handheld games*, which seems only to indicate the portable nature of the hardware used; those handheld games included in the encyclopedia are only those that would also qualify as *video games* because of the use of some imaging technology. The term is also typically used for devices for which the primary purpose is that of game playing, whereas games on other portable devices, such as cell phone games, are usually referred to as *mobile games*. Thus, in many cases, there is a great overlap in terminology, which, more than anything else, indicates shared technological or practical commonalities and a specific focus of attention rather than an exclusive group of games.

Some overlap is inevitable in the entries as well. For example, there are separate entries for “controllers” and “peripherals” because not all peripherals are controllers (e.g., 3-D glasses or external CD-ROM drives), and, likewise, not all controllers are peripherals (e.g., the buttons, joysticks, and trackballs built into arcade game cabinets). And “joysticks,” although a subset of controllers, is also deserving of a separate entry because their own historical development is long and varied enough to warrant individual attention and because part of their history lies outside of their use as video game controllers. Two other terms are potentially ambiguous; as used here, *3-D graphics* usually refers to stereoscopic imagery that results in an illusion of depth, whereas *three-dimensional graphics* refers to graphics that include perspective views and that are computed through the rendering of points, lines, and planes within a mathematically three-dimensional space.

Throughout the encyclopedia, many entries include a “See also” notice, alerting readers to related topics that are also covered. Most entries also include a “Further Reading” section that lists a few sources that may be of interest as well as any works cited in the entry. Along with books and periodicals, websites have been included in these lists, as there is a wealth of material that can only be found online. The Guide to Related Topics helps readers trace broad themes and ideas across the entries, and a detailed subject index provides ready access to information in the entries.

Finally, this encyclopedia could have easily been many times the size it is; even three volumes can only do so much to explore the vast world of video games. The conceptual division of material, the selection of which entries would be included, and the relative sizes of those entries were, of course, difficult to determine, and I have tried to achieve as much balance as possible. Although there are entries on well-known topics that one would expect, such as “Atari,” “Nintendo,” and “*PONG*,” there are also lesser-known topics, such as the “crash of 1977,” “*Quraish*,” “suicide battery,” and “Zeebo.” Other entries are included with their usefulness to a scholarly audience in mind, such as “dimensionality”; “dual in-line parallel (DIP) switches” (the settings of which can affect game content and thus game analysis); “game genealogies”; “silent film”; and “*Sony v. Bleem*,” an important court case for video game scholarship that involves the fair use of screenshot imagery. Other entries provide in-depth history and little-known information for familiar subjects (e.g., the “joysticks” entry).

In an era of online encyclopedias, it is not enough to merely cover persons, places, and things, so I have also included entries that are thematic or theoretical in nature and attempted to cover video games’ form, content, and multiple contexts, be they social, cultural, industrial, or technological. Browsing is perhaps one of the most common ways that people experience reference works, and this has been kept in mind during the compilation and design of this encyclopedia. At more than a half million words, it is one of the largest academic projects I have been involved with, and I hope that readers will find as much pleasure in browsing it as I have had compiling it as its editor.

Acknowledgments

This project has allowed me to meet people from all over the world who are writing about video games, and I have learned a great deal while putting these volumes together. So I would first like to thank all the contributors, Espen Aarseth, César Albarrán-Torres, Frederick Luis Aldama, Jessica Aldred, Lynn Alves, Aubrey Anable, Kara Lynn Andersen, Thomas H. Apperley, Rhino Ariefiansyah, Dominic Arsenault, Ben Aslinger, Barry Atkins, Guillermo Averbuj, Ralph H. Baer, Andrew Baerg, Jason Scott Begy, Matt Benic, Tamás Beregi, Ophélie Bernard, Courtney Blamey, Alexis Blanchet, Wolfgang Boehm, Ian Bogost, Nis Bojin, Maude Bonenfant, Jonathan Bonneau, Aaron D. Boothroyd, Andrew Borman, Kelly Boudreau, Etienne Brunelle-Leclerc, P. Konrad Budziszewski, Nolan Bushnell, Mark Butler, Kursat Cagiltay, Brett Camper, Marco Benoit Carbone, Marcus Carter, Sandra Castro Pinzón, Francisco Cattaneo, Daniel Cermak-Sassenrath, Humberto Cervera, Peichi Chung, Karen Collins, Mia Consalvo, Patrick Crogan, Paul Dalg, Erwan Davisseau, Suzanne de Castell, Mario De Govia, Patrick Deslaurriers, Jennifer deWinter, Laurie-Mei Ross Dionne, Joseph C. DiPietro, Tristan Donovan, Simon Dor, Judith Dormans, David Dowling, Jon-Paul C. Dyson, Trevor Elkington, Barrie Ellis, Graciela Esnaola Horacek, Anna Everett, Gerald Farca, Febrian, Alexander Fedorov, Richard E. Ferdig, Simon Ferrari, Jean-Pierre Flayeux, Alberto Flores del Río, Eelke Folmer, Gonzalo Frasca, Gundolf S. Freyermuth, Melanie Fritsch, Mathias Fuchs, Tracy Fullerton, Anthony Y. H. Fung, Enrico Gandolfi, Manuel Garin, Ben Gill, Harrison Gish, Anne Githuku-Shongwe, Tim Glaser, Eitan Glinert, Christopher Goetz, Martin Goldberg, Racquel M. Gonzales, Sebastian González Canepa, Paweł Grabarczyk, Louis-Martin Guay, Stephan Günzel, Ian Hamilton, Christopher Hanson, Todd Harper, Philip Hausmeier, Mark Hayse, Leonard Herman, Alejandro Iparraguirre, Joshua Jarrett, David Javet, Jennifer Jenson, Ashley P. Jones, Rhys Jones, Kristine Jørgenson, Jesper Juul, Radwan Kasmiya, Dafna Ester Kaufman, Andrew Kemp-Wilcox, Brendan Keogh, Aphra Kerr, Wesley Kirinya, Carly A. Kocurek, Kyle Kontour, Lars Konzack, Tanya Krzywinska, Julian Raul Kücklich, Laura Iseut Lafrance St-Martin, Nicolle Lamerichs, Michael Liebe, Henry Lowood, María Luján Oulton, Martin Lüthe, Vincent Mauger, Frans Mäyrä, Ken S. McAllister, Greg McLemore, Kyle Moody, Sebastian Möring, Souvik Mukherjee, Sheila C. Murphy, Gathoni Mwai, Andrei Nae, Victor Navarro-Remesal, David Nelson, Benjamin Wai-ming Ng, Ben Nicoll, Michael Nitsche, Rolf F. Nohr, David O'Grady, Minako O'Hagan, Caren Pagel, William Clyde Partin III, Matthieu Pellet, John Reid Perkins-Buzo, Bernard Perron, Martin Picard, Rachel F. Pickett, Teddy Pozo, Daniel Reynolds, William B. A. Robinson, Guillaume Roux-Girard, Judd Ethan Ruggill, TreaAndrea M. Russworm, Taiyoung Ryu, Ulf Sandqvist, Rita Santoyo Venegas, Damien B. Schlarb, Stefan Schubert, Kevin Schut, Bobby Schweizer, Jean Paul Simon, Tim Skelly, Songsri Soranastaporn, Doug Stark, Jaroslav Švelch, Grant Tavinor, Carl Therrien, Michael Thomasson, Staci Tucker, Çetin Tüker, Ethan Tussey, John Vanderhoef, Curt Vendel, Rachel Wagner, Matthew Weise, Karin Wenz, Thomas Westin, Zach Whalen, Colin Wheeler, Markus Wiemker, Hanna E. Wirman, Bryan-Mitchell Young, Nelson Zagalo, and Xenia Zeiler. And thanks likewise go to Veronika Keller, Sasha Pohlman, Joost Raessens, and Heidi Campbell for suggesting authors. I would also like to thank Kristi Ward, George Butler, John Wagner, Catherine M. Lafuente, Barbara Patterson, and Patrick Hall at ABC-CLIO/Greenwood Press for their help and participation, and everyone who offered their help on various entries. At home, I am again thankful for the patience and support from my wife, Diane, and my sons, Michael, Christian, and Francis, who allowed me the time to work on this encyclopedia, and even introduced me to a few new games. And, as always, thanks be to God.

A

Abbas, Reine

Reine Abbas was one of the first female game designers in the Middle East and the first to be a founder of a game company. In addition to her administrative duties as head of the Art Department, she also does character design, art direction, and animation and has taught game design and animation.

Abbas received her master's degree in visual arts from the Académie Libanaise Des Beaux-Arts in Dewaneh, Lebanon, in 2000; attended the Digipen Institute of Technology in Redmond, Washington, in 2002–8; and founded the art department at AKE/Digipen-Lebanon and was department head for six years. In 2008, she cofounded Wixel Studios with Ziad Feghali and business partner Karim Abi Saleh. Based in Kaslik, Lebanon, Wixel Studios was the first independent gaming company in Lebanon. It creates advergames and educational games for mobile platforms (iOS and Android) and the World Wide Web. The company also acts as a gamification consultancy for businesses, providing training in the areas of game design and systems implementation.

Abbas was art director and lead artist for games that include *Collitical* (2008), *Douma Game* (2008), *Furn Al Shebbak* (2008), *Gaza Shield* (2009), *Who Does Egypt Want?* (2010), *Santa's Rookie* (2010), *Civil Guardians* (2011), *My Balls* (2011), *Little Heroes—Big Deeds* (2012), *Survival Race: Life or Power Plants* (2012), and more. A number of her games also have a political purpose. *Douma Game* was a fighting game that used Lebanese politicians as its playable characters, and *Gaza Shield* was made during the Gaza Clash of 2008–9; its making was documented in an award-winning film of the same name. *Survival Race: Life or Power Plants*, set in a postapocalyptic world decimated by environmental destruction and climate change, was one of the most popular mobile games in the Middle East, with more than seven hundred thousand downloads and around forty thousand monthly users. In addition to game design, she was also the art director and lead artist for the Arab World's first animated interactive political documentary, for the Lebanese political party Jebha Front, during the 2009 elections.

Abbas is also a mother of three children and a serial entrepreneur. Abbas's son told her that he wanted her to teach him how to create video games and to come to his school and teach the students there how to code because kids are playing video games but not creating them. Finding it outrageous at first, Abbas proposed the idea to her son's teacher. Soon Abbas was allowed to prepare and give a fourteen-hour course on game coding, design, and storytelling. The results were outstanding; the school and Abbas received feedback from parents saying that this experience changed the lives of their children.

The course's success led Abbas to create SpicaTech Academy for independent gamers and producers, giving them a lifetime kit to create games from scratch and growing the gaming industry in the region by creating new games instead of Arabizing video games. SpicaTech began as a mobile academy but is now being integrated into two schools to teach coding during school hours. Abbas wants to expand access to reach as many students as possible to teach them how to code. She believes that creating video games can give them skills to think logically, tell a story, design a game, market a product, solve problems, be a producer, and manage both projects and time.

Abbas's work has been recognized around the world, and she has won many awards, including the WIT Women in Technology Award 2010, the WOW award for artistic expressions 2013 at the Sixth New Arab Woman Forum, one of Inc.com's five most powerful women in gaming in 2013, and one of the World's 100 Most Powerful Arab Women in both 2014 and 2015 as selected by ArabianBusiness.com. She was also the winner of the MIT Enterprise Forum Pan Arab Region competition in 2017, a finalist in the Brilliant Lebanese Awards by BLC Bank in 2018, and a finalist in the Cartier Women's Initiative Awards of 2019. In 2019, she also won the Best Animation award at the ARFF Paris International Awards for her music video "Right Now."

Mark J. P. Wolf

See also: Gamification; Lebanon; Middle East

Further Reading

Abbas, Reine. "Happy Faces: 'Right Now.'" YouTube, July 3, 2019. Music video. Available at https://www.youtube.com/watch?v=OMnHRaYrT9E.

Cartier Women's Initiative. "Finalist 2019 Middle East & North Africa: Reine Abbas." Available at https://www.cartierwomensinitiative.com/candidate/reine-abbas.

Dalakian, Glen. "Lebanese Entrepreneur Named One of the Five Most Powerful Women in Gaming." Wamda, May 21, 2013. Available at https://www.wamda.com/2013/05/lebanese-entrepreneur-named-one-of-the-five-most-powerful-women-in-gaming.

Elias, Monica. "Founder's Journey: Reine Abbas." ArabNet, December 19, 2018. Available at https://www.arabnet.me/english/editorials/entrepreneurship/founders-journey-reine-abbas.

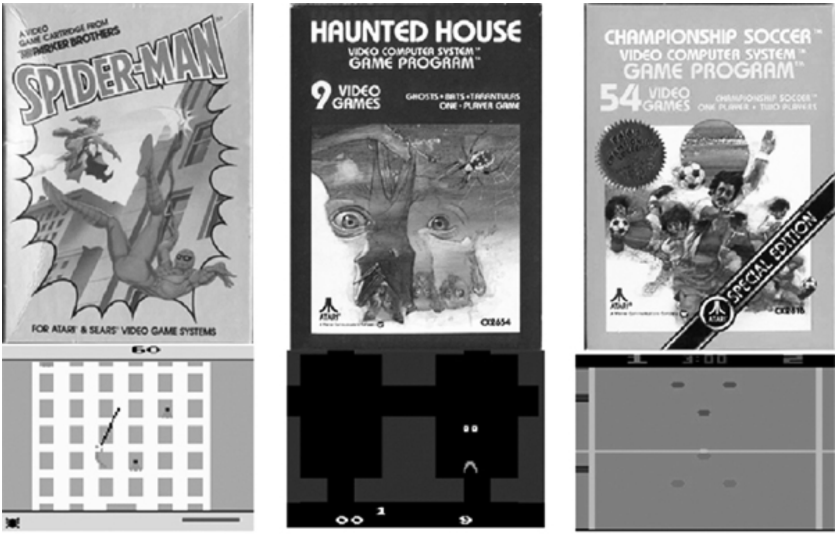
SpicaTech Academy website. Accessed October 20, 2020. Available at http://spicatechacademy.com/alpha/subscribe.

"The World's 100 Most Powerful Arab Women." *Arabian Business*, March 3, 2014. Available at https://www.arabianbusiness.com/the-world-s-100-most-powerful-arab-women-541034.html.

Abstraction

Video games emerged at a time when abstract art was in vogue, although the abstraction found in early games was typically the result of technical limitations rather than deliberate artistic choice. As technology improved, designers strove for greater representational ability in game graphics; as a result, the possibilities offered by abstraction are usually neglected, and its potential remains largely unexplored.

Video games require abstract imagery to be read in a new way. Because video games are simultaneously imagery and events, game elements can be abstract in both appearance and behavior. Players must learn to identify the different elements seen on-screen and understand how they function and behave, which includes distinguishing between the player-controlled characters, computer-controlled characters, objects that can be manipulated and used, and static background imagery. Knowing the role and function of each game element, where they begin and end, and how they affect the player character is crucial to learning a game. As these elements grow more abstract, however, so too can the game's objectives, as both the interface and gameplay grow less intuitive. Thus, another reason for making game elements representational is the default assumptions and diegetic structures that accompany them and make both the interface and gameplay more transparent and intuitive.


SPIDER-MAN
FOR ATARI & SEARS VIDEO GAME SYSTEMS
60
HAUNTED HOUSE
VIDEO COMPUTER SYSTEM GAME PROGRAM
9 VIDEO GAMES
GHOSTS • BATS • TARANTULAS
ONE • PLAYER GAME
CX2654
CHAMPIONSHIP SOCCER
VIDEO COMPUTER SYSTEM GAME PROGRAM
54 VIDEO GAMES
SPECIAL EDITION

Cartridge box images compared to the rather abstract graphics of the actual game screens. (Courtesy of Mark J. P. Wolf)

In early video games, player-controlled characters were often function-based; instead of an anthropomorphic character, the player was represented on-screen by a graphic of a tool or vehicle that the player controlled, including spaceships, tanks, planes, cars, or even a simple rectangular "paddle." Such characters represented rigid objects for which a minimum of animation was needed because they tended to move in straight lines or turn in place, whereas characters with moving arms and legs required more animation and computing power. Later characters were humanoid but still minimalist figures barely recognizable as such. The simple, abstracted graphics aided player identification in that they were generic figures lacking specific detail; anyone could identify with them because markers indicating such things as gender, race, and age were not present. Some player characters were as simple as a square, a ball, or even a kind of spark, as in the arcade game *Qix* (1981). Other arcade games using abstract designs include *Pac-Man* (1980), *Tempest* (1981), *Q*bert* (1982), *Quantum* (1982), *Marble Madness* (1984), and *Tetris* (1988), and several of these games were successful enough to inspire sequels. The graphics of early home video games in the 1970s and 1980s were also limited by technology; on the Atari VCS 2600, for example, the background graphics making up the playing field could only be drawn on the left half of the screen and were then duplicated on the right half, either as a repetition or a mirror image of the left side, accounting for much of the horizontal symmetry found in the early Atari games.

As computer hardware advanced, graphics capabilities improved, and gameplay and graphics grew more representational, as video games strove to imitate media such as film, television, and comics. Representational game graphics provide a way to visually benchmark a system's graphics technology, and this is used to sell games (although simpler graphics are occasionally used to produce a retro feel). Relatively few abstract games were produced for a while after the 1980s, but abstraction found a use within game graphics, particularly the texture mapping used in three-dimensional polygonal graphics—for example, the patterns and designs appearing as surface textures found on objects and settings. Texture maps display patterns such as rust, cracks, grain, splatter, corrosion, and wear—subject matter often explored in abstract art. It is through the application of these abstract texture maps that video game imagery achieves heightened realism and greater representational ability.

With the rise of independent games during the 2000s and 2010s, abstraction made something of a comeback because of the relative ease of programming games with simpler graphics. Many of these games used two-dimensional graphics with simple shapes, such as squares, rectangles, and other polyhedra, as in such games as *The Marriage* (2006), *The Impossible Game* (2009), *Super Hexagon* (2012), *Thomas Was Alone* (2012), *140* (2013), and *Mini Metro* (2015). Some, like *Antichamber* (2013), used abstract imagery to produce three-dimensional spaces through which the player had to navigate. Other games, like *Geometry Wars: Retro Evolved* (2009), took advantage of the popularity of the retrogaming movement by referencing the styles of abstraction found in the designs of early games.

Finally, even the most representational games will always, to some degree, be an abstraction of the things or situations they are trying to represent or simulate. As the player's mind completes or imagines game details, he or she is more engaged and involved in the game. Simplified versions of situations found in video games may even allow players to feel a greater sense of order and understanding than they find in their own lives. Abstract games may not be learned as intuitively as representational games, yet abstraction need not imply simplicity. Complexity may even help bring about a rebirth of the abstract game.

Abstraction's role in video games has ranged from perceptual abstraction to conceptual abstraction, but it appears to be both a necessary and inevitable part of the video game playing experience. Rather than try to avoid or sublimate abstraction, game design can usefully incorporate abstraction, resulting in new gaming experiences and game conventions. Just as computer simulations and mathematical visualization have taken graphic design in directions other than photorealistic representation, abstraction can expand and explore the great potential that the video game medium has to offer.

Mark J. P. Wolf

See also: Art; Art, Video Games as; Dimensionality; Graphics

Further Reading

Chuk, Natasha. "The Importance of Abstraction." First Person Scholar, September 25, 2015. Available at http://www.firstpersonscholar.com/the-importance-of-abstraction.

Wolf, Mark J. P. "Abstraction in the Video Game." In *The Video Game Theory Reader*, edited by Mark J. P. Wolf and Bernard Perron, 47–65. New York: Routledge, 2003.

Abzû

Published by 505 Games and developed by Giant Squid Studio, *Abzû* was initially released in August 2016 for PCs and the PlayStation 4; it was subsequently released for Xbox One and Nintendo Switch. This was the debut title for the studio, cofounded by Matt Nava who had previously worked as art director on thatgamecompany's *Journey* (2012). The goal with *Abzû* was to convey the dreamlike feeling of ocean exploration.

The player takes on the identity of the Diver, exploring the rich and vibrant underwater spaces, each possessing a distinctive ecosystem and atmosphere. The game's story is told through a few cutscenes, gameplay elements (mainly returning life to barren landscapes), and the use of murals with hieroglyphics found in the ancient ruins of a lost civilization. Even if these formal narrative elements are left open to interpretation, the game can be said to be about restoring balance and life to the ocean. Through each level, the player is tasked with solving simple puzzles to progress, but the game is not about puzzle solving or moving from one objective to another. It is more about being engrossed in the art, a contemplative approach already put forward by the other titles from that game company.

To be able to convey emotions and feeling through the game design, the idea was to craft an intuitive system that would allow the player to stay immersed. Swimming is one of the key elements to achieve this vision. For example, to move faster, the player can use a boost command, but there is an actual rhythm to it. Holding the corresponding button down will not result in additional speed. The player must press and release the button, effectively interacting and responding to the Diver's animation. Furthermore, except for the few prompts by the game to teach the player how to control the player character, the game designers guide the player through visual and audio cues alone, which are subtly incorporated in the environment through several tools. One of them is the use of "portal cards," to highlight specific silhouettes in the game. Each is composed of a simple plane with light falloff (affecting the behavior of light in relation to its light source) that fades out when the camera is in close proximity. They are placed inside the level to provide a fake fog-like effect, effectively highlighting a path that would otherwise hardly be noticeable in the environment.

The game reward experimentation and each discovery of a new interaction with the wildlife is rewarding in itself and helps further the sustained, lived connection with the world. One of the biggest feats of *Abzû* is the incorporation of a dynamic interactive ecosystem, where up to ten thousand fish can be present at the same time, responding to each other as well as the player's presence. This is also true of every living creature and its environment: the kelp forest gently sways with the water current and moves whenever the player or fish pass through, sea critters may flee at the proximity of the Diver, and fish can be eaten by bigger predators. Players can also latch onto bigger fish and swim along, even breaching through the water's surface with their newfound companions.

Laurie-Mei Ross Dionne

See also: Contemplative Games

Further Reading

Game Developers Conference. "Creating the Art of ABZU." YouTube, September 22, 2017. Available at https://www.youtube.com/watch?v=l9NX06mvp2E&feature=youtu.be.

Wawro, Alex. "*Abzu* and the Challenge of Conveying Emotions through Game Design." Gamasutra, August 2, 2016. Available at https://www.gamasutra.com/view/news/278331/Abzu_and_the_challenge_of_conveying_emotions_through_game_design.php.

Accessibility

Within the field of human-computer interaction, game accessibility refers to the accessibility of digital games, which is further explained in the following sections.

GAMES AND BARRIERS

Disability can be very broadly defined as a mismatched interaction between the abilities of a person and the thing he or she is trying to achieve. This means coming up against an environmental or societal barrier that results in difficulty performing a day-to-day task.

Games are fundamentally about barriers strictly defined by game rules. With no barriers to overcome, there would be no challenge; it would no longer be a game. Games challenge the abilities of the player in a loop of interaction: output has to be perceived and then processed and decided upon, and input actions have to be taken and performed correctly, often within a certain time window. However, many barriers in games are unintended and unnecessary. *Game accessibility* means the removal of unnecessary barriers within the limitation of game rules.

There are common misconceptions that game accessibility means expensive, difficult work to dilute a game to suit a tiny niche who do not play games anyway. None of this is true. If considered early enough, a great deal can be done cheaply and easily, opening up what makes the game enjoyable to a large number of players, including disabled gamers, who have the same reasons to play as anyone else plus others that range from escapism to participation in society to physiotherapy.

MOTIVATIONS AND INDUSTRY EFFORTS

Designing for game accessibility has wide-ranging benefits: the commercial benefit of widening the customer base; the human benefit it brings to players through the access to culture and socialization that games offer; and the broad benefit to game design in general. When designed for one hand, the game is also designed for a broken arm or for someone holding a beer. When designed for deaf gamers, it is also designed for people playing on mute because of a sleeping baby. When designed for low vision, the game can be played with a screen in bright sunlight.

The game industry has made efforts for game accessibility almost as long as digital games have existed. For instance, a difficulty level setting is essentially a universal access solution by stretching the concepts of “easy” and “hard.” Support for color-blind people is also a common accessibility feature in games. Although many disabled people still have trouble playing many games on the market, there has been a real change in the game industry due to the combined pressure of special interest groups, charities, and individuals for many years. From 2015 onward, the 21st Century Communications and Video Accessibility Act (CVAA) in the United States (www.fcc.gov/consumers/guides/21st-century-communications-and-video-accessibility-act-cvaa) began to be implemented; it was fully implemented after January 1, 2019. Consequently, interest in this topic has significantly increased at industry events such as the Game Developers Conference since about 2014.

STRATEGIES, METHODS, AND SOLUTIONS

The strategies required vary from game to game. This is a fundamental difference between games and other industries; what constitutes a necessary versus unnecessary barrier is unique to a particular game (as game rules are unique to each game). This makes accessibility an optimization process of figuring out the best approach for each game by considering what kind of barriers may be present related to the loop of interaction. Accessibility can be handled at three levels: hardware (e.g., Xbox Adaptive Controller [news.microsoft.com/stories/xbox-adaptive-controller/]); external software (e.g., screen reader, zoom, copilot); and within games (e.g., button remapping, subtitles).

Solutions to most barriers can be found through one of two strategies:

1. Multimodal communication of information (e.g., subtitles, speech, pattern, shape, color, audio cues, visual cues).
2. Offering options that allow the experience to adapt to player needs and preferences (e.g., different control schemes, input devices, difficulty).

The key to enable a good user experience and accessibility is to try doing it right from the start. For example, deciding not to use small text at the start is a design decision. Deciding to change small text to large later in development means expensive and difficult unpicking and refactoring. The key tools are to use existing best practice guidelines (see, e.g., www.gameaccessibilityguidelines.com, www.accessible.games, and www.accessiblegamedesign.com); to get expert help; and to test directly with disabled players. Each has its own strengths and weaknesses, but they balance each other out; developers who can use multiple tools stand the greatest chance of having as many people as possible having as good an experience as possible. The Microsoft Xbox Adaptive Controller and copilot mode serves as an excellent example of how the game industry can codesign solutions together with organizations and disabled people.

Retrofitting games is sometimes possible but often requires expertise by the gamer as well as external hardware and software, especially for consoles (see www.consoletuner.com). Modifications (mods) of game software and hardware are sometimes possible on PCs. *AudioQuake* (see agrip.org.uk) and *Doom3[CC]* (see www.youtube.com/watch?v=LnLyKbCjlog) are examples of advanced software mods for people who are blind or deaf. Access to game engines, including visual editors, goes beyond strict game accessibility but is closely related to not only making games for, but also with and by, people with disabilities; see, for example, the screen reader access in Microsoft Visual Studio (docs.microsoft.com/en-us/visualstudio/ide/reference/accessibility-tips-and-tricks?view=vs-2017).

Beyond games for mainstream audiences, there are also audio games specifically made for (and often by) disabled people. Audio games can be played without visual feedback; instead, they use audio-based techniques such as audio cues or speech (see audiogames.net). Furthermore, one-switch games for motor-disabled people can be played with a single button. Oneswitch.org.uk provides a comprehensive overview of many one-switch games.

RESEARCH, EDUCATION, AND THE FUTURE

In parallel with game industry and community efforts, game accessibility has been researched since the early days of computer games (see Sheredos 1973). Some main categories, with a few examples of more recent research, are the following:

(1) design tools: methods (Grammenos, Savidis, and Stephanidis 2007), guidelines (O'Hagan and Mangiron 2013; Westin et al. 2018), and simulations (Scott, Spyridonis, and Ghinea 2015); (2) development: input/output methods (Nordvall 2013) and game engines (Garcia and Neris 2014; Torrente et al. 2014); (3) education (Westin and Dupire 2016); (4) surveys (Yuan, Folmer, and Harris 2011); and, not least of all, (5) legislation (Brooks 2017; Powers, Nguyen, and Frieden 2015).

A trajectory is set. Resources are available. In addition to the above, there have been roundtables, talks, and events at the Game Developers Conference every year since 2004, and since 2017, there has been a dedicated Game Accessibility Conference (#GAConf, www.gaconf.com). Today, academic conferences also have tracks for game accessibility, such as the International Conference on Computers for Handicapped Persons (ICCHP) (see www.icchp.org/session/10698). Open educational resources (OERs) are also available (see igda-gasig.org/oer), and an ever-growing community of advocates and specialists is available to help.

Accessibility is not an inevitability. The dialogue needs to continue, and everyone needs to keep pushing: management exerting top-down pressure to empower employees, developers who know what to do and want to do it working bottom-up on the ground, and, externally, the gaming community being vocal about what they want and need. And if we can do that, if we can maintain that pressure, we can turn these initial forays of inclusion into lasting cultural change.

Thomas Westin, Barrie Ellis, Ian Hamilton, and Eelke Folmer

See also: Health (Physical)

Further Reading

Brooks, A. L. "Accessibility: Definition, Labeling, and CVAA Impact." In *Recent Advances in Technologies for Inclusive Well-Being: From Worn to Off-Body Sensing, Virtual Worlds, and Games for Serious Applications*, edited by A. L. Brooks, S. Brahnam, B. Kapralos, and L. C. Jain, 283–383. Cham, Germany: Springer International Publishing, 2017.

Garcia, F. E., and V. P. D. A. Neris. "A Data-Driven Entity-Component Approach to Develop Universally Accessible Games." In *UAHCI/HCII 2014*, edited by C. Stephanidis and M. Antona, 537–548. Crete, Greece: Springer, 2014.

Grammenos, D., A. Savidis, and C. Stephanidis. "Unified Design of Universally Accessible Games." In *Universal Access in Human-Computer Interaction,* edited by C. Stephanidis, 607–616. Applications and Services. UAHCI 2007. Lecture Notes in Computer Science, vol. 4556. Berlin, Heidelberg: Springer, 2007.

Nordvall, M. "The Sightlence Game: Designing a Haptic Computer Game Interface." In *Proceedings of the 2013 DiGRA International Conference: DeFragging Game Studies, 2013,* Tampere, Finland.

O'Hagan, Minako, and C. Mangiron. *Game Localization: Translating for the Global Digital Entertainment Industry*. Amsterdam, Netherlands: John Benjamins Publishing Co., 2013.

Powers, G. M., V. Nguyen, and L. Frieden. "Video Game Accessibility: A Legal

Approach." *Disability Studies Quarterly* 35, no. 1 (2015). Available at http://dsq-sds.org/article/view/4513.

Scott, M. J., F. Spyridonis, and G. Ghinea. "Designing Accessible Games with the VERITAS Framework: Lessons Learned from Game Designers." In *HCI International 2015*, edited by M. Antona and C. Stephanidis. Los Angeles, CA: Springer, 2015.

Sheredos, S. J. "Games for the Severely Disabled." In *Bulletin of Prosthetics Research*, vol. 19, edited by William M. Bernstock, 130–137. Washington, DC: Veterans Administration, Department of Medicine and Surgery, 1973.

Torrente, J., Á. Serrano-Laguna, Á. D. B. Aguado, P. Moreno-Ger, and B. Fernández-Manjón. "Development of a Game Engine for Accessible Web-Based Games." In *GALA 2013*, edited by A. D. Gloria, 107–115. Switzerland: Springer International Publishing, 2014.

Westin, T., and J. Dupire. "Evaluation and Redesign of a Curriculum Framework for Education about Game Accessibility." In *ICEC 2016*, edited by G. Wallner, S. Kriglstein, H. Hlavacs, R. Malaka, A. Lugmayr, and H.-S. Yang, 217–222. Vienna, Austria: Springer, 2016.

Westin, T., J. J. Ku, J. Dupire, and I. Hamilton. "Game Accessibility Guidelines and WCAG 2.0—A Gap Analysis." In *ICCHP 2018*, edited by Georgios Kouroupetroglou, 270–279. Linz, Austria: Springer International Publishing, 2018.

Yuan, B., E. Folmer, and F. Harris. "Game Accessibility: A Survey." *Universal Access in the Information Society* 10, no. 1 (2011): 81–100.

Activision

Activision, Inc., is an American video game development and publishing company and the first third-party video game developer in history. Before it was founded on October 1, 1979, game development had been the exclusive domain of game console manufacturers.

The company was formed by four Atari programmers: David Crane, Robert Whitehead, Alan Miller, and Larry Kaplan. Under the management of Atari executive Ray Kassar (who saw games as mere products rather than as artistic expression and held programmers in notoriously low esteem), game creators at Atari did not receive design credit or royalties. Crane, Whitehead, Miller, and Kaplan—who, according to a 1978 internal memo, together accounted for 60 percent of Atari's game sales profits—decided that the only feasible way to gain creative freedom as well as proper recognition and financial compensation for their work was to leave Atari and start their own business. Lacking managerial experience, they enlisted the help of James Levy, a music industry veteran, who joined them as Activision's president and chief executive officer.

The four programmers' dissatisfaction with the treatment they received at Atari, along with Levy's background in the music business, strongly informed the way the company treated programmers. The designer's name was placed on the game cartridge and packaging (initially on the back of the box but later prominently on the front), and his or her picture, signature, and short biography were featured in the instruction manual along with personal gameplay tips.

Activision initiated the practice of placing game screenshots on the back of the retail box. It also instituted the first "achievement" program, wherein players could earn a commemorative sew-on patch for beating a specific score or time challenge in a given game.

Atari launched a number of lawsuits against the fledgling company, claiming, among other things, copyright and patent infringement. Activision won or settled every suit. Following the success of their Atari VCS 2600 titles (including *Freeway* [1981], *Kaboom!* [1981], *Pitfall!* [1982], and *River Raid* [1982]), Activision proceeded to expand their catalog with releases for the ColecoVision and Intellivision systems as well as for the Atari 5200 and the Atari 400/800 line of home computers. However, having suffered heavy financial losses in the wake of the video game industry crash of 1983, the company abandoned the home console market in 1984 and focused on home computers for the next few years. In the same year, Alan Miller and Robert Whitehead left Activision to form their own company, Accolade.

In 1986, Activision acquired Infocom, the developer of text-based adventure games. (Due to several questionable management decisions and steadily declining profits, Infocom shut down three years later.) Soon after, David Crane left the company, largely because of disagreements with newly appointed CEO Bruce Davis, whose management style was reminiscent of Kassar's. With Crane's departure, Activision lost the last of its founding fathers (Larry Kaplan had left in 1982 to take the position of vice president at Atari).

In 1988, the company decided to branch out into business and productivity software, changing the corporate name to Mediagenic, although games continued to be released under the Activision label. The diversification strategy was not successful, and Mediagenic filed for bankruptcy in 1992. Extensively reorganized, the company returned to its original name and focused exclusively on console-based games and computer games.

Over the following years, Activision expanded dynamically and acquired a number of game companies, including Raven Software, Neversoft, Infinity Ward, and Bizarre Creations as well as publisher Red Octane. In 2008, it merged with French developer Vivendi Games. The resulting entity, Activision Blizzard, became the world's largest independent game publisher.

P. Konrad Budziszewski

See also: Activision Blizzard

Further Reading

Activision website. Accessed October 11, 2020. Available at http://www.activision.com.

Fleming, Jeffrey. "The History of Activision." Gamasutra, July 30, 2007. Available at https://www.gamasutra.com/view/feature/1537/the_history_of_activision.php.

Activision Blizzard

Activision Blizzard is a holding company that was founded in July 2008 through the merger of the two influential North American game publishers and developers Activision and Blizzard Entertainment. Both Activision and Blizzard Entertainment were significant influencers in the game industry, with many titles deriving from these companies causing significant trends in game design and in the industry. With their merger in 2008, Activision Blizzard became one of the largest Western publishers and developers in the years thereafter. In this entry, the significance of Activision Blizzard's merger is reflected on through consideration of the influence of their games and industry practices. In addition, this entry also considers the ongoing tensions underpinning this merger, as many of Activision Blizzard's recent game design and monetization choices have been widely criticized.

When Activision and Blizzard Entertainment merged in 2008, both publishers brought a catalogue of influential games with them. Activision's catalogue of published games is vast, as many different development studios had independently produced games under its label since 1980. In 2008, Activision possessed a strong reputation for a series of seminal console games that included the *Guitar Hero* series, the *Tony Hawk's Pro Skater* series, and the ongoing *Call of Duty* series. Of note, 2007 saw the release of *Call of Duty 4: Modern Warfare*, which was the best-selling game in North America in 2007 and garnered much critical acclaim.

In contrast to Activision's vast catalogue of published games and largely console-orientated focus, Blizzard Entertainment was known for a small selection of franchises almost exclusively on the PC—*Warcraft*, *Diablo*, and *StarCraft*—with each franchise known for seminal titles in its respective genre. Moreover, in each of these franchises, Blizzard Entertainment had attracted fervent player bases and participatory cultures with titles such as *StarCraft* (1998) pioneering esports in South Korea (Taylor 2012, 22) and *World of Warcraft* (2004) boasting almost twelve million active subscribers in 2008. With the merger of these two companies and their respective portfolio of games across different platforms, Activision Blizzard's status as a prominent developer of console and PC games was solidified.

The past decade has seen Activision Blizzard operate as one of the top five video game companies in the world by revenue, often peaking as the highest-grossing game company in North America (Jordan 2018). This prominent status has seen Activision Blizzard expand into the mobile market with the acquisition of King.com Limited, the developer of the popular free-to-play (F2P) puzzle game *Candy Crush Saga* (2012). In addition, it entered a ten-year publishing deal with Bungie in 2010 and expanded into the esports market with *Overwatch* League (2018) and *Call of Duty* League (2020). However, more recently, some of their monetization and game design choices have been harshly criticized, as many players have opposed the direction of franchises such as *Diablo* into a mobile format (Grayson 2018). These game design decisions hint at the challenges facing a large company such as Activision Blizzard when the players of their games expect very different experiences from different titles. Moreover, for Activision Blizzard as a company, these game design decisions combined with the disappointing performance of Bungie's *Destiny 2* (2017) and the huge success of rival titles such as Epic Games' *Fortnite* (2017) caused the holding company's shares to substantially fall in 2018–19 (Taylor 2018). It remains to be seen whether this trend will continue, but given the company's success, its stock is likely to rebound as it seeks to expand more heavily into mobile, esports, and free-to-play (F2P) games.

Joshua Jarrett

See also: Activision

Further Reading

Grayson, N. "Blizzard Says It Wasn't Expecting Fans to Be This Angry about *Diablo Immortal*." Kotaku, November 3, 2018. Available at https://kotaku.com/blizzard-says-it-wasnt-expecting-fans-to-be-this-angry-1830204721.

Jordan, J. "Earnings Report Roundup: Game Industry Winners and Losers in Q4 2017." Gamasutra, March 16, 2018. Available at https://www.gamasutra.com/view/news/315575/Earnings_report_roundup_Game_industry_winners_and_losers_in_Q4_2017.php.

Taylor, H. "Activision Blizzard Stock Tumbles Following *Diablo Immortal* Backlash." GamesIndustry.biz, November 6, 2018. Available at https://www.gamesindustry.biz/articles/2018-11-06-activision-blizzard-stocks-tumble-amid-fan-backlash-over-diablo-immortal.

Taylor, T. L. *Raising the Stakes: E-Sports and the Professionalization of Computer Gaming*. Cambridge, MA: MIT Press, 2012.

Adaptation

Distinguishing adaptation from simulation is essential to understanding the video game adaptation's expanded position in the entertainment industry. Although all video games are simulation on some level, whether based on preexisting sports or games or on imagined experiences like battling dragons or waging space warfare, video game adaptations specifically work from source material that originated in another medium, most commonly film, television, or print media such as novels or comics. In doing so, video game adaptations confront specific practical, cultural, and artistic challenges. Although adaptations have been part of the video game industry since its early origins, more recent widespread conglomeration in the entertainment industry has brought a rapid rise in the number of adaptations published annually (Elkington 2008, 217). Similarly, video games are increasingly the inspiration for films, television, and novels—all part of a general trend toward what media theorist Henry Jenkins and others have termed "media convergence." Technological innovation makes media an ever-increasing part of our daily life. At the same time, media production is increasingly housed under unified corporate umbrellas, such as Time Warner and Viacom. Consequently, media conglomerates look to maximize or synergize content across multiple commercial and technological platforms in the hope of lessening risk and increasing profit (Jenkins 2006, 17–18).

With the rapid expansion of the video game industry over the past two decades, it follows that the entertainment industry would capitalize on this popularity. However, the commercial and creative failure of games such as Atari's *E.T.: The Extra-Terrestrial* (1982) did little to bolster the public perception of video game adaptations. Notorious as one of the largest critical and commercial failures in the history of video games and as a harbinger of the industry's crash in 1983 (Kent 2001, 239), *E.T.* also became a symbol of what was wrong with video games based on movies. Video game adaptations quickly gained a reputation for low-quality, blatant commercialism.

Although video game adaptations have increased their share of industry space year over year and are now de rigueur for any blockbuster film or television series, the public impression has been that they are quickly produced at the expense of quality to seize short-term profits. This suspicion is borne out by critics' review scores, where video game adaptations consistently score lower on average than nonadaptations (Elkington 2008, 217). However, the challenges in adapting a television or film property into interactive form go beyond simple cost cutting. Conflicts in development processes, the fact that a large percentage of adaptations are based on children's franchises and do not appeal to adult critics, and a pervasive skepticism toward adaptations in general all affect the success of any adaptation released (Elkington 2008, 223–225). Exceptions do occur, such as Vivendi's *The Chronicles of Riddick: Escape from Butcher Bay* (2004), but they are usually presented as the exception to the rule.

Similarly, movies and television series based on video games also generally receive poor critical reception. Early examples, such as the films *Super Mario Bros.* (1993) and *Street Fighter* (1994), often cut or altered characters and plot points at the expense of the source material or by necessity provided history and motivation for video game characters that originally had none, such as the animated series based on Namco's *Pac-Man* game franchise. Created by Hanna-Barbera, the series, which ran from 1982 to 1984, expanded on the scant characterization offered in the game by exploring Pac-Man's marriage to Mrs. Pac-Man, giving him pets, detailing his life in Pac-Land, and introducing new adversaries. Although necessary to create a narrative universe, these types of changes to known and accepted characters run the risk of alienating the original fan base that the adaptations are aimed at by omitting key details and being perceived as taking liberties with the source material. It is a challenge that faces any adaptation from one medium to another.

At the same time, the disparity in financial stakes between a major motion picture and a major video game release as well as the difference in economic scale between the film and television industries on one side and the video game industry on the other create an imbalance in influence, such that the video game originators often have difficulty maintaining creative control over their product (Elkington 2008, 218). The initial fanfare and subsequent shelving of Peter Jackson's *Halo* film adaptation suggests that even the appeal of one of the most commercially successful video game franchises in history is no guarantee of influence within the film industry. The imbalance of power between the two industries was clear enough that in 2005, Douglas Lowenstein, then head of the

Entertainment Software Association, acknowledged the disparity between industries and saw fit to devote his remarks at that year's E3 Expo to what it would take "for the game industry to be as big or bigger than the film industry at some point in the future" (Lowenstein 2005).

Although film and television adaptations both to and from video games occupy the largest segment of the adaptation trend, there has been a simultaneous expansion in games adapted from print media, most commonly from comic books and graphic novels, such as 2K's *The Darkness* (2007) and the popular DC and Marvel comic universes. Novels and comic series based in the *World of Warcraft* and *Halo* universes likewise expand on ideas and characters that originated in video games in a form that can be enjoyed away from the computer console.

The rapid growth of adaptation into or based on video games finds its roots in the conglomeration of entertainment and communication companies. With corporations such as Sony, Time Warner, and Viacom holding interests in film, television, publishing, and video games, it is perhaps natural that the flow of ideas becomes less focused on a given medium and instead revolves around the franchise itself. As Jenkins writes, "More and more, storytelling has become the art of world building. . . . The world is bigger than the film, bigger even than the franchise. . . . World-making follows its own market logic" (Jenkins 2006, 114). Jenkins points to projects such as *The Matrix* games, movies, and graphic novelizations; the cluster of products released around Peter Jackson's *Lord of the Rings* movies; and other cross-platform or "transmedia" development as proof that the central intellectual property (IP) is now more important than any one product within that cycle. As such, entertainment conglomerates increasingly plan centrally around the IP, looking to cross-pollinate within their own corporation or outward to other production partners. Although the products of media convergence expand beyond more straightforward categorization as adaptation, the rate and presence of cross-media productions seems likely to continue to increase as long as the entertainment industry sees value and advantage in adapting central franchises into numerous forms and genres.

Trevor Elkington

See also: Industry; Merchandising; Subcreation

Further Reading

Elkington, Trevor. "Too Many Cooks: Media Convergence and Self-Defeating Adaptions." In *The Video Game Theory Reader 2*, edited by Bernard Perron and Mark J. P. Wolf, 213–235. New York: Routledge, 2008.

Jenkins, Henry. *Convergence Culture*. New York: New York University Press, 2006.

Kent, Steven L. *The Ultimate History of Video Games: From Pong to Pokémon and Beyond*. New York: Three Rivers Press, 2001.

Leitch, Thomas. *The Oxford Handbook of Adaptation Studies*. Oxford, UK: Oxford University Press, 2017.

Lowenstein, Douglas. "E3 Expo State of the Industry Address." Entertainment Software Association Archive, May 18, 2005. Available at https://web.archive.org/web/20071120210450/http://www.theesa.com/

archives/2005/05/e3expo_2005_sta.php.

Phillips, Andrea. *A Creator's Guide to Transmedia Storytelling: How to Captivate and Engage Audiences across Multiple Platforms*. New York: McGraw-Hill Education, 2012.

Addiction

The term *addiction* is used in medicine, psychology, and psychiatry to characterize a compulsion or excessive dependence on something. The term is often used to describe or diagnose overdependence on such things as gambling, drugs, or alcohol. Medically, the American Academy of Pain Medicine, the American Pain Society, and the American Society of Addiction Medicine define addiction as "a primary, chronic, neurobiologic disease, with genetic, psychosocial, and environmental factors influencing its development and manifestations. It is characterized by behaviors that include one or more of the following: impaired control over drug use, compulsive use, continued use despite harm, and craving."

Parents, educators, government officials, and researchers have seemingly always been interested in the amount of time that children and adults spend with media such as television, computers, and video games. However, people began referring to *computer addiction*, *video game addiction*, and—more recently—*screen-time addiction* because of stories of excessive and compulsive gameplay. In one case, a Chinese man died after playing online games continuously for fifteen straight days; in a second case, American ten-month-old twins drowned when their father left them in a bathtub so that he could go play a video game. An organization called Online Gamers Anonymous was even created after the founder's son committed suicide while playing an online game.

Research has provided evidence that some gamers show classic signs of addiction (Grüsser, Thalemann, and Griffiths 2007; Young 2009). Those symptoms include lying about game use, becoming preoccupied with gaming, losing interest in other activities, withdrawing from others, and using gaming as a psychological escape (Leung 2004). Researchers have also suggested that gaming addiction is about impulsiveness (Starcevic and Aboujaoude 2017), motives to play, and changing neurobiological features (Billieux, Deleuze, Griffiths, and Kuss 2015). Those same researchers do admit that diagnoses and detection of these symptoms can be difficult because of society's increased use of computer technologies in daily life.

Internet addiction was described in the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association 2013). Notably, "there was not sufficient evidence to determine whether the condition is a unique mental disorder or the best criteria to classify it at the time the *DSM-5* was published in 2013. However, it recognized internet gaming disorder in the section recommending conditions for further research, along with caffeine use disorder and other conditions" (American Psychiatric Association 2019, 2).

However, there is also evidence that video game play can be beneficial for health, education, training, and business (Ferdig 2009). At the very least, games, particularly online, multiplayer games, provide enjoyment through increased social relationships (Klimmt, Schmid, and Orthmann 2009). Therefore, caution should be exercised in reading and understanding media coverage related to video game addiction.

Richard E. Ferdig

See also: Health (Mental); Health (Physical)

Further Reading

American Academy of Pain Medicine, American Pain Society, and the American Society of Addiction Medicine. *Definitions Related to the Use of Opioids for the Treatment of Pain*, 2001. Available at http://www.painmed.org/pdf/definition.pdf.

American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders (DSM-5)*. Washington, DC: American Psychiatric Pub, 2013.

American Psychiatric Association. *Internet Gaming*. Washington, DC: American Psychiatric Publishing, 2019. Available at https://www.psychiatry.org/patients-families/internet-gaming.

Billieux, J., J. Deleuze, M. D. Griffiths, and D. J. Kuss. "Internet Gaming Addiction: The Case of Massively Multiplayer Online Role-Playing Games." In *Textbook of Addiction Treatment: International Perspectives*, edited by Giuseppe Carrà, Nady el-Guebaly, and Marc Galanter, 1515–1525. Berlin, Germany: Springer, 2015.

Ferdig, R. E., ed. *Handbook of Research on Effective Electronic Gaming in Education*. Hershey, PA: Information Science Reference, 2009.

Griffiths, M. "Online Computer Gaming: Advice for Parents and Teachers." *Education and Health* 27, no. 1 (2009): 3–6.

Griffiths, M. "Videogame Addiction: Further Thoughts and Observations." *International Journal of Mental Health and Addiction* 6, no. 2 (2008): 182–185.

Grüsser, S. M., R. Thalemann, and M. D. Griffiths. "Excessive Computer Game Playing: Evidence for Addiction and Aggression?" *Cyberpsychology & Behavior* 10, no. 2 (2007): 290–292.

Klimmt, C., H. Schmid, and J. Orthmann. "Exploring the Enjoyment of Playing Browser Games." *CyberPsychology & Behavior* 12, no. 2 (2009): 231–234.

Leung, L. "Net-Generation Attributes and Seductive Properties of the Internet as Predictors of Online Activities and Internet Addiction." *CyberPsychology & Behavior* 7 (2004): 333–348.

Starcevic, Vladan, and Elias Aboujaoude. "Internet Gaming Disorder, Obsessive-Compulsive Disorder, and Addiction." *Current Addiction Reports* 4, no. 3 (2017): 317–322.

Young, K. "Understanding Online Gaming Addiction and Treatment Issues for Adolescents." *American Journal of Family Therapy* 37, no. 5 (2009): 355–372.

Adventure

Written by Warren Robinett, *Adventure* (1979), for the Atari VCS 2600, was the first graphical adventure game, and it can also be credited with a number of other firsts. Based on the all-text game *Adventure* (1976) by Will Crowther and Don Woods, Robinett's *Adventure* was the first game to feature multiple screens that cut one to the next as the player moved from room to room, imitating the linked locations of a text adventure game (and using only four kilobytes of memory). Conservation of screen direction was used to continue the action (i.e., when the player's character exited one screen on the right, it reappeared on the left side of the next screen), making *Adventure* the first to use cinematic conventions to orient the player in the game's diegetic world.

The game's world consisted of thirty interconnected screens linked in a manner that could not be mapped onto a two-dimensional plane. The rooms included two labyrinths, three castles—the Golden Castle, the White Castle, and the Black Castle, each of which had a portcullis that could be open or closed—and castle interiors represented by other screens.

Not only did *Adventure* have navigable space, but it was also the first graphical game to feature significant off-screen events that the player would discover after they had happened; the Black Bat that flew screen to screen could pick up and drop objects even when it was off-screen, which in turn affected the game and could even result in a loss for the player. The Black Bat was also the first computer-controlled character to have more than one behavioral state (agitated and not agitated). The game's three dragons, Yorgle (the yellow dragon), Grundle (the green dragon), and Rhindle (the red dragon), were the first identically shaped characters whose algorithmic behavior differed; each had different duties guarding different objects, and each had a different level of aggression.

Adventure was also the first game to feature graphical, portable objects on-screen (as opposed to being located in an inventory) that a player character could pick up, use, and drop and that could be carried by a computer-controlled character as well (the Black Bat). These objects included a key for each castle, a sword, a chalice, a magnet, and a bridge that allowed the player character to pass through walls and that was needed to access several disjointed regions within the game.

Adventure was also the first game in which a player found an Easter egg (a hidden feature waiting to be found). Because programmers did not receive credit for their games, Robinett put a graphic of his name in a secret room that players would not easily discover by accident; thus, the game also became the first to feature a screen credit for its programmer.

Adventure sold well and was a popular game. In several online polls, it was voted the best cartridge for the 2600, despite the fact that it was among the earliest cartridges to appear. In 2005, a sequel game, *Adventure II*, was written by Curt Vendel and released on the Atari Flashback 2 system.

Mark J. P. Wolf

See also: Adventure Games; Atari; Atari VCS 2600

Further Reading

Robinett, Warren. Foreword to *The Video Game Theory Reader*, edited by Mark J.

P. Wolf and Bernard Perron, vii–xix. New York: Routledge, 2003.

Warren Robinett website. Accessed September 1, 2020. Available at http://www.warrenrobinett.com/adventure/index.html.

Adventure Games

Games of the adventure genre differ from other games in that they are set in a game world usually made up of multiple connected rooms, locations, or screens that the player can freely explore in relatively nonlinear fashion. The games also typically involve an objective that is more complex than simply catching, shooting, capturing, or escaping, although completion of the objective can involve several or all of these. Objectives usually must be completed in several steps, for example, finding keys and unlocking doors to other areas to retrieve objects needed elsewhere in the game. Characters are usually able to carry objects, such as weapons, keys, tools, and so on. Settings often evoke a particular historical time period and place, such as the Middle Ages or Arthurian England, or are thematically related to content-based genres, such as science fiction, fantasy, or espionage. Although most massively multiplayer online role-playing games (MMORPGs) would qualify as adventure games, they are usually considered a separate genre unto themselves because of all the player interaction that makes them very different from single-player adventure games.

Although many adventure games have some kind of monster, villain, or other character opposed to the player's character, they often do not have an antagonist in the classic sense. The world of the game itself takes on that role as players attempt to learn and navigate its geography; gain access to its hidden, closed, and locked areas; and discover how to use the various objects and devices within it. Exploration, navigation, accessing restricted areas, and tool usage are found in many other genres, but in the adventure genre, they occupy a central position and are often the subgoals necessary for the achievement of the main objective; the discovery of how such subgoals contribute to the overall objective is itself also a part of the experience and essence of the adventure game.

HISTORY OF THE GENRE

Adventure games began when Peter Langston's *Wander* (1974) was written, though it would fall into obscurity until decades later. A game that proved to be more influential appeared when Willie Crowther, a computer programmer, combined his interest in cave exploration and mapping, the role-playing game *Dungeons & Dragons*, and his background in programming to produce what would come to be known as *Colossal Cave Adventure* (1975), which would be developed further by Don Woods into *Adventure* (1976). The all-text game consisted of descriptions of a series of connected rooms through which a player moved by typing responses, such as "n" for "north" or "d" for "down." The player also needed several objects, such as keys or a lamp, during the game. Such games came to be known as text adventures, or interactive fiction, and Infocom was the company known for producing them.

After playing Crowther and Woods's *Adventure* at Stanford, Atari programmer Warren Robinett decided that it could work as a video game and took on the challenge of translating such a game into a 4,096-byte Atari cartridge, a task that Robinett's boss at Atari thought was impossible. Various problems that had to be solved included how to represent rooms and their connectedness; usable objects that could be carried around, picked up, and dropped; and autonomous creatures that would be encountered during gameplay. *Adventure* (1979) became the first graphical adventure game and featured thirty interconnected screens that used the cinematic convention of cutting from one to the next rather than scrolling, making it the first video game to use multiple screens. The game also had disjointed regions that the player could only access with the use of certain tools (e.g., the keys to open castle gates, the bridge to pass into walled areas) as well as off-screen actions the player could encounter later (e.g., the bat could pick up and drop objects while the player was elsewhere). Other adventure games for the Atari VCS 2600 followed, including *Superman* (1979), *Haunted House* (1981), *Raiders of the Lost Ark* (1981), *Venture* (1982), *E.T.: The Extra-Terrestrial* (1982), *Krull* (1983), *Dark Chambers* (1988), and the *Swordquest* series of games. *Dragonstomper* (1982) was an adventure game that was also an early role-playing game.

Adventure games also appeared on home computers, which could provide more memory for games. Richard Garriott's *Ultima* (1980) was the first home computer game to feature scrolling in both horizontal and vertical directions, resulting in a large playing field of which only a portion was seen at once. *Ultima*'s four-way scrolling screen technique, using tiled graphics that were added or removed from the edges of the screen as it scrolled, was developed by Garriott with his friend Ken Arnold, who was one of the programmers that developed the computer game *Rogue* the same year (*Rogue* was another adventure game with a graphical display made of ASCII characters; e.g., the player's character was represented by an "@" that could be moved around the screen).

Beginning with Roberta Williams's *Mystery House* (1980), text adventure games also began to include graphics, which acted as illustrations for the game's text. These illustrations were more detailed than the typical graphical adventure games of the time, but they were for the most part only images with which players could not directly interact. These images did introduce a first-person perspective into the games, which helped to engage the player more and compensate for the lack of a graphical user interface.

Advances in graphics display standards also made better-quality graphics possible. Before 1984, the Color Graphics Adaptor (CGA) standard, which allowed image resolutions of 320-by-200 pixels with a 4-color palette (or 620 by 200 with a 2-color palette), was used by DOS computers for graphic displays. Such harsh graphical restrictions made representational imagery difficult, and it was not until the 1984 release of the Enhanced Graphics Adaptor (EGA) standard, which allowed image resolutions of 640 by 350 with 16 supported colors from a 64-color palette, that images began to dominate the screen in what were still mainly text-based adventure games. In 1987, graphics improved again when the Video Graphics Array (VGA) standard appeared with images of 640-by-480 pixels and a 256-color palette. Later, Super VGA (SVGA) would increase image resolution to

800-by-600 pixels.

During the 1980s, and especially after the appearance of the graphical user interface, home computer adventure games began to add features originally found in console-based games, making them less like the early all-text adventures. Roberta Williams's *King's Quest* (1984) introduced the idea of an animated character that walked over the background graphics, and *King's Quest III: To Heir Is Human* (1986) had a clock on the title bar, with events occurring at specific times, adding an element of time pressure to the game. ICOM Simulations' *Déjà Vu 1: A Nightmare Comes True* (1985) had an inventory box, similar to video games like *Raiders of the Lost Ark* (1981) for the Atari 2600. It was also one of the earliest home computer games to use a mouse and cursor, giving it point-and-click capability similar to home video games using joysticks with firing buttons, although it mainly used point-and-click for selecting objects from an inventory window or choices from a menu rather than avatar control or spatial navigation. Despite these advances, however, the images used in many of these games were still more or less illustrations of what was essentially text-based interaction.

A more user-friendly and graphically oriented interface came in 1987 with the introduction of the Script Creation Utility for *Maniac Mansion* (SCUMM) game engine written by Ron Gilbert and Aric Wilmunder of Lucasfilm Games (now LucasArts) that was used (and named) for the game *Maniac Mansion* (1987). LucasFilm Games would go on to use versions of the SCUMM engine for its games into the 1990s. Although characters could be directed by clicking in the "animation window," the interface did not allow direct avatar control, as was found in even the earliest home video games, but it did provide, along with cutscenes, on-screen action that the earlier graphically illustrated games lacked. After the release of the Nintendo Entertainment System (NES) in 1985, home video game systems had improved to the point where home computer games could be ported to them, resulting in the cross-platform release of many home computer adventure titles. Likewise, more adventure titles were originating in home console systems, such as *The Legend of Zelda* series, which first appeared in 1986.

After 1987, an increasing number of CD-ROM-based games were released, beginning with *The Manhole* (1987), and the greater amount of memory available encouraged the use of better graphics, better sound, and even integrated video clips. Advances in computer animation meant more photorealistic graphics, and full-motion video (FMV) began appearing in games, beginning with Trilobyte's spring 1993 release *The 7th Guest*, which was over a gigabyte in size (because of its video clips) and the first CD-ROM game to require two discs.

In September 1993, Cyan's *Myst* was released, which would surpass *The 7th Guest* as the best-selling game of all time. *Myst* gave new twists to familiar ideas, innovating and developing existing traditions, conventions, and graphics of the adventure genre, especially in regard to creating an integrated and seamless experience for the player. Like *Maniac Mansion*, the player's character cannot die in *Myst*, which keeps players from being ejected from the game before they want to leave. Graphically, *Myst* was designed to keep players within the game's world as much as possible. *Myst* would eliminate almost all informational graphics, with almost everything integrated directly into the game world itself. *Myst* was followed by *Riven* (1997) and several more sequels.

The success of *Myst* renewed interest in the adventure genre, leading to a wide range of CD-ROM-based adventure games, including *Ray Bradbury's The Martian Chronicles* (1995), *Frankenstein through the Eyes of the Monster* (1995), *AMBER: Journeys Beyond* (1996), *Bad Mojo* (1996), *Gord@k* (1996), *Lighthouse: The Dark Being* (1996), *Noir: A Shadowy Thriller* (1996), *Obsidian* (1996), *Of Light and Darkness* (1996), *Rama* (1996), *Timelapse* (1996), *Titanic: Adventure out of Time* (1996), *Safecracker* (1997), *Treasure Hunter* (1997), *Weird: Truth Is Stranger Than Fiction* (1997), the *Rhem* series, the *Riddle of the Sphinx* series, the *Schizm* series, the *Shivers* series, and the *Syberia* series. Other games and games series, like the *Grand Theft Auto* series, could also be considered adventure games, even though they are often not billed as such.

Finally, alongside single-player games, MMORPGs took the adventure genre in a new direction with large, persistent (twenty-four hours a day, seven days a week) worlds that feature hundreds of thousands of players within them. As descendants of the multiplayer online text adventure games from the mid-1980s (such as the sixteen-player *Sceptre of Goth* [1983]), these games offer an experience so different from single-player adventure games that they arguably constitute their own genre; nonetheless, they are an extension and development of the worlds developed in the single-player adventure games whose history is described in this entry.

Other games, such as *Minecraft* (2009), feature procedurally generated worlds that are too large to explore in their entirety. Many single-player games have also incorporated elements from other genres and influenced the design of their game worlds. Such overlapping has blurred the boundaries of the adventure genre, but exploration, navigation, and tool use will always remain at the heart of the adventure genre.

Mark J. P. Wolf

See also: *Adventure*; *Minecraft*; *Myst*; *Procedural Generation*; *Riven*; Text Adventure Games; *Ultima* series

Further Reading

Ant, "Wander (1974)—A Lost Mainframe Game Is Found!" *Retroactive Fiction*, April 22, 2015. Available at https://ahopeful.wordpress.com/2015/04/22/wander-1974-a-lost-mainframe-game-is-found/.

Just Adventure website. Accessed September 1, 2020. Available at http://www.justadventure.com.

Monfort, Nick. *Twisty Little Passages: An Approach to Interactive Fiction*. Cambridge, MA: MIT Press, 2005.

Robinett, Warren. Foreword to *The Video Game Theory Reader*, edited by Mark J. P. Wolf and Bernard Perron, vii–xix. New York: Routledge, 2003.

Advergames

Coined in 2000 by Andrew Giallourakis, the term *advergames* refers to video games that are used as a venue for advertising. However, the practice of advergaming has been around for decades. Even when game graphics were relatively abstract, companies produced games to advertise their products. Although some games include product placement or company logos (e.g., *Pole Position* [1982] used in-game roadside signs to advertise real companies), such games are generally not considered advergames, especially when advertising was not the main purpose for the games' creation. Advergames are often produced by the company doing the advertising or are at least initiated by them if a third-party developer is involved in the production. Early advergames include three made for the Atari VCS 2600: *Kool-Aid Man* (1983) (also made for Mattel's Intellivision), Purina's *Chase the Chuck Wagon* (1983), and *Pepsi Invaders* (1983), which was commissioned by Coca-Cola for a sales convention and featured letters that spelled "PEPSI" arranged like *Space Invaders* that the player shot at. Because of their relative rarity, all three cartridges are sought after by game collectors.

Advergaming grew into big business during the late 1980s and the 1990s as more companies began developing games. The companies most interested in advergaming tended to be those marketing food and drink for a younger crowd; snack food and soda companies, such as 7-Up, Coca-Cola, Cheetos, and Pepsi; and fast-food restaurant chains, such as Burger King, McDonald's, and Domino's Pizza. This trend continued into the 2000s, as games were produced promoting Chex, Cap'n Crunch, Doritos, and Skittles. Car manufacturers, including BMW, Toyota, and Volvo, also produced advergames. Some of these games, like the ones for cereals, came packaged with the product as an extra incentive to purchase, whereas others required the customer to mail in for them or buy them for a relatively low price compared with retail prices for other games.

After the appearance of web-based games, advergames also began appearing online, usually with links to companies' websites. This allows games to be more closely connected with the company and the user with company information. It also allows the games to spread digitally without additional cost, resulting in what companies hope will become viral marketing. These advances and advantages have helped advergames grow into a multi-billion-dollar business, and the greater availability of game creation tools makes them an affordable advertising venue for a wider range of businesses. Services such as Massive Networks can even place ads into video games that are connected online through the use of software development kits that place advertising images on in-game billboards, posters, and other surfaces and can change these ads over time.

Because of their close connection with a product and the positive feelings that advertisers want users to feel in relation to their products, most advergames are casual games that are neither too complicated nor taxing to play. By delivering a gaming experience, the user also receives something in return for his or her time spent with the advertisement, thus making advergames a way to actively involve the audience in the advertising process.

Mark J. P. Wolf

See also: Advertising

Further Reading

Edery, David, and Ethan Mollick. *Changing the Game: How Video Games Are Transforming the Future of Business*. Upper Saddle River, NJ: FT Press, 2008.

Zichermann, Gabe, and Joselin Linder. *Game-Based Marketing: Inspire Customer Loyalty through Rewards, Challenges, and Contests*. Hoboken, NJ: John Wiley & Sons, 2010.

Advertising

The relationship of advertising to video games is complex and varied. Video games have been produced as advertisements; they are commonly marketed through print and television advertisements as well as other forms of product placement; and they have been placed within video games, both enhancing and connecting games to the world outside of the game and bringing the nongame world deeper into the social and cultural sphere of video games. More than a simple marketing tool, advertising is a pervasive part of contemporary culture, and its role in video games testifies to advertising's inescapable ubiquity.

Historically, early home video game systems were advertised in newspapers and magazines, often in ads directed to an adult male audience that typically might be found in the bars and taverns where arcade games were located. Although not strictly an advertisement, the appearance of Atari's *PONG* product line in the Sears catalog, which sold everything from tools to car parts to clothing and soft home goods, was indicative of the movement of the games industry into the home itself, as leisure items for home electronics enthusiasts and for general family fun.

Marketing kits and early promotional materials also advertised and instructed gamers on how to imagine their new products—as a site for family togetherness or educational fun, as evidenced in the early Atari catalogs. Some companies chose to promote games and systems with celebrity spokespeople, including Kareem Abdul-Jabbar (*Basketball* [1978] by Atari), William Shatner (Commodore VIC-20), and George Plimpton (Mattel Intellivision). Specialty publications geared toward the gamer market are another key advertising site for both game systems and software. *Nintendo Power* magazine (and the Nintendo telephone hotline) lent the Nintendo brand an aura of authenticity and illustrated the scope and scale of its products for its fans. In 1989, Universal Pictures released the feature film *The Wizard*, which follows a young gamer to a Nintendo gaming tournament, highlighting both the Super Nintendo Entertainment System (SNES) and its catalog along the way, functioning as a "program-length commercial" for Nintendo and its titles.

Since the early 1980s, advertising elements have crept into the video games themselves, sometimes lending authenticity to a game world and other times disrupting its virtual coherency. So-called advergames emerged very early on—from the infamous Atari *Chase the Chuck Wagon* (1983) game, which promoted a popular dog food brand, to titles like the Japanese *Pepsiman* (1999) game—advertising readily adapted gaming platforms into marketing outlets.

A common example of in-game advertising can be seen in the popular *Madden* franchise, with the incorporation of pop-up advertisements in *Madden NFL 10* (2009). As technology advances and game styles and genres shift, there are new opportunities to combine advertising and gaming. When new, a pop-up advertisement or a branded in-game element is disruptive and noticeable (as designed). Over time, this changes, and new strategies are employed. The contemporary media environment, from social media to gaming, has trained players to recognize brands, branding, and franchises, creating an increasingly dense context in which advertising occurs.

Historically, one can look back and see such advertising moments throughout gaming history, such as when *Pole Position* (1982), advertisements for products such as Canon and Pepsi were incorporated as billboards posted alongside the race course, making the game's simulation more authentically like that of a real Formula One race. And, of course, games often feature simulated advertisements, from billboards to radio spots (as in *Grand Theft Auto III* [2001]), echoing just how much advertising has become central to everyday life.

In-game advertising has become a key aspect of many sports games, where advertising on arena and stadium spaces also lends to the realism of the game itself. The Electronic Arts (EA) game *Battlefield 2142* (2006) notified its audience that EA and advertising partner IGA Worldwide would monitor and update in-game advertisements via internet tracking software installed as part of the game. This system, referred to as *adware* or *spyware*, allows for regular in-game updates to advertising but also raises many privacy questions for gamers. Although controversial at first, many online console-based games now allow for advertisements to be updated regularly, creating new commercial content for variety within the game. Many games have been partnered with brands from other companies, such as *SEGA's Crazy Taxi* (1999) and Kentucky Fried Chicken or the cobranding of *Enter the Matrix* (2003) and Sprite, the former of which is itself a very long, playable transmedia advertisement for the film *The Matrix Reloaded* (2003). Indeed, today one even sees political advertisements in games such as *Burnout Paradise* (2008), which ran ads for then presidential candidate Barack Obama alongside paid spots for JL Audio, Burger King, and Gillette. This marked the first time a political campaign had purchased in-game advertising.

These developments of in-game advertising have led to the emergence of advergames, games made explicitly *as* advertising materials, such as the Burger King Microsoft Xbox titles *PocketBike Racer* (2006), *Big Bumpin'* (2006), and *Sneak King* (2006). Like other advergames, these titles incorporated the advertised brand into the game's own logic, or what Ian Bogost has called a game's "procedural rhetoric": concepts that become part of a game's code and ethos (Bogost 2007). Some game-advertiser collaborations take the interactive component of gaming even further, as in the "/pizza" command in *EverQuest II* (2004), which allowed gamers to order Domino's pizza from within the game world and have it delivered to their homes.

Whether advertising is outside of a game, part of the fabric of the game world, or incorporated into collaborative branded partnerships, it is thoroughly integrated into video gaming, and innovations in video game advertising will surely keep pace with the industry as it continues to develop and grow.

Sheila C. Murphy

See also: Advergames

Further Reading

"Advertising in Video Games." Wikipedia. Accessed September 1, 2020. Available at https://en.wikipedia.org/wiki/Advertising_in_video_games.

Bogost, Ian. *Persuasive Games: The Expressive Power of Videogames*. Cambridge, MA: MIT Press, 2007.

Edery, David, and Ethan Mollick. *Changing the Game: How Video Games Are Transforming the Future of Business*. Upper Saddle River, NJ: FT Press, 2008.

"In-Game Advertising." Wikipedia. Accessed September 1, 2020. Available at https://en.wikipedia.org/wiki/In-game_advertising.

Kinder, Marsha. *Playing with Power in Movies, Television, and Video Games: From Muppet Babies to Teenage Mutant Ninja Turtles*. Berkeley: University of California Press, 1991.

Newman, James. "The Myth of the Ergodic Videogame: Some Thoughts on Player-Character Relationships in Videogames." *Game Studies* 2, no. 1 (July 2002). Available at http://gamestudies.org/0102/newman/.

Affordances

In a direct reference to the verb *to afford*, the original definition of an *affordance* was coined by J. J. Gibson (1979) and refers to what an environment "offers the animal, what it provides or furnishes, either for good or ill. . . . It implies the complementarity of the animal and the environment" (127). According to his theory, affordances are all the conceivable actions made available to an actor by its surroundings. In that sense, affordances of a specific object contain all the possibilities it allows a subject. These are openly available and not constrained by any goals or intentions an actor may have. For instance, a chair can be used to sit upon, to block a door, or to be thrown at someone. It is up to the actor to select the action that best suits his course of action.

For Gibson, all the actions of a distinct actor are part of a network of behaviors defined by how he lives. To help explain this phenomenon, Gibson borrows the ecological term *niche* to pinpoint a set of affordances that dictates how an actor interacts with his surroundings. This niche is organized with positive and negative affordances that designate respectively its advantageous courses of action and its constraints. For instance (and applied to what this encyclopedia is about), in a racing video game, while roads, bridges, ramps, and power-ups are positive affordances, buildings, other vehicles, trees, and fences are mostly negative.

In design, the concept of affordance has been mainly revisited by Donald Norman (1988, 2013) to appoint a possibility for action an object may suggest. According to his theory, "the term affordance refers to the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used" (9). While Gibson's affordances regroup all the possible actions between an actor and an object, Norman calls affordances only those that are based on perceived properties of an object, context, and actor experiences. Nowadays, and despite their differences, Norman's concept is mostly followed in the field of design and often faultily considered as the Gibson theory.

However, a notable contribution to the concept has been developed by William Gaver (1991), who applies Gibson's original definition to the multidisciplinary field of human-computer interaction (HCI). According to Gaver, affordances "are properties of the world defined with respect to people's interaction with it" (80). In other words, the design of a manufactured object must provide clear calls to expected actions. And affordances are properties nested inside a controlled design process. Therefore, in reference to all these theories, we can summarize that an affordance is an actional relationship between a person and an object, an idea of an action a user assumes about an object he encounters.

For these reasons, and contrary to popular belief, an affordance is not the object itself or a sign that signifies its presence. To be clear, the first supports the action, whereas the second is used to highlight it. In other words, there is a distinction to make between the object, the possible action it affords (the affordance), and, in some cases, a sign that suggests its possibilities. Yet, to get perceived and be induced in the user's mind, a video game affordance needs to be initiated by a complex combination of opposition mechanisms and conventions. And when opposition mechanisms mainly manifest themselves using signs and settings, conventions are learned or established from our experience of the world or video game culture.

SIGNIFIERS

With the growing complexity of interactive content, Gaver urges designers to use signs to inform the user about how to correctly operate the object. He argues that "when apparent affordances suggest different actions than those for which the object is designed, errors are common and signs are necessary" (1991). Later, and to clarify his concept, Norman (2013) makes the same observation and states that affordances need "signifiers" to show where the action takes place. He defines signifiers as "a mark or sound, any perceivable indicator that communicates appropriate behavior to a person" (14). He asserted that it is through the affordances that designers can inform the user of the action envisioned. To guarantee a clear message, the sign must stand out from the complexity of the graphics and be rigorous about the conduct it is supposed to imply.

To ensure their visibility and emphasize their visual impact, signifiers are usually part of a different sign universe than the rest of the content; they will be in visual opposition. Depending on the video game genre and what is needed to be conveyed to the player, this oppositional difference will vary from strong to subtle. In general, this difference will be strong to reach a large audience or to support an intensive rhythm of gameplay. Like the notorious exclamation point over non-player characters (NPC) in *World of Warcraft* (2004) to indicate the availability of a quest, developers are inclined to append a two-dimensional sign over a three-dimensional world to help players to understand where (and by extension how) to interact with the system. Through a strong paradigm disjunction, those signs stand out because they are in opposition with the general content of the environment.

On the other hand, when exploration and visual immersion of the player are prioritized, this opposition is usually less visible at first sight. In realistic three-dimensional action-adventure video games, those signs are subtly *integrated* and use the same sign universe as the overall graphic content. To help orient the player navigation, they mostly get players' attention through visual discontinuities. Sometimes those discontinuities manifest through an added signifier (symbols as overlaid information, lighting effects, marks, etc.). A typical example is the classic horizontal white edge (worn or painted) highlighting the climbing path in both *Tomb Raider* (2013) and *Uncharted 4: A Thief's End* (2016). At other times, it is through the quality or the behavior of the object (color, shape, disproportion, animation, etc.). In that case, a classic example is the navigation path indicated through the positioning of red objects in *Mirror's Edge* (2008). Sometimes it is through the visual environment (strategic positioning of objects), and sometimes they are all combined.

CONVENTIONS

Aside from opposition mechanisms, an object can also suggest an action by a learned or established convention provided either by the real world or other media, including the video game universe. A good example is the pipe used in the *Splinter Cell* franchise and introduced as a game mechanic in *Tom Clancy's Splinter Cell* (2002). Through a tutorial, developers change the meaning of a simple representation, increase players' possibilities of interaction with the environment, and, by doing so, integrate a new element to the players' ecological perception. Driven by the success of the franchise, this mechanic has been largely adopted by the developer community to the point that it is now an established convention that is even used in games for children, such as *Disney Infinity* (2013).

While conventions can be fabricated within video game culture, others are recycled from other media or from the real world. Depending on the context and as Marie-Laure Ryan (2006) suggested by referring to Salen and Zimmerman (2003), "if an object . . . looks like a car[,] . . . the user will know that it can be used to move around in the game world" (289). Thereby, when supported by the game system, some object representations keep their embedded function from their regular use in the real world. In that sense, when users see a door, a flight of stairs, or a health kit on the wall, they will be prompted to engage in real-world reasoning to process the possible interactions with which they are familiar.

On the other hand, some objects need adjustments when represented in a video game; for instance, the well-known white box with a red cross that represents a health kit, which was used in realistic three-dimensional action-adventure video games until the mid-2000s, needed to be redesigned after the nonprofit organization the International Red Cross and Red Crescent Movement (commonly known as the Red Cross) intervened to remove the use of its emblem (which is protected by the Geneva convention and is not in the public domain). In reaction, video game companies then reorganized original qualities of the object to suggest a strong familiarity without being identical in form. (In *Tomb Raider: Anniversary* (2007), the red cross was replaced by a red Arabic star. In *Far Cry 2* (2008), developers incorrectly used the caduceus instead of the rod of Asclepius to symbolize healing and medicine. In *Halo: Reach* (2010), the red cross was changed to the letter *H,* for health.)

CONCLUSION

A video game affordance is not the interactive object itself or the sign that indicates its presence. It is an idea of an action that an object is supposed to infer in the user's mind according to the design intention, the setting (i.e., the three-dimensional visual environment), and the overall social and cultural context. To conclude, a video game affordance is an actional relationship between a user and an object whose recognition can be assisted by a signifier and from which a designed behavior is supposed to emerge according to the user's social practices and video game culture.

Erwan Davisseau

See also: Game Design

Further Reading

Gaver, William. "Technology Affordances." In *Proceedings of the ACM CHI 91 Human Factors in Computing Systems Conference*, edited by Scott P. Robertson, Gary M. Olson, and S. Judith, 79–84. April 28–June 5, 1991.

Gibson, J. J. *The Ecological Approach to Visual Perception*. Boston: Houghton Mifflin, 1979.

Norman, Donald. *The Psychology of Everyday Things*. New York: Basic Books, 1998. Revised and expanded edition, 2013.

Ryan, Marie-Laure. "Computer Games as Narrative." In *Avatars of Story*, 181–203. Minneapolis: University of Minnesota Press, 2006.

Salen, K., and E. Zimmerman. *Rules of Play: Game Design Fundamentals*. Cambridge, MA: MIT Press, 2003.

Africa

Many Africans have been playing video games since their childhood. Some of the most popular consoles in the early 1990s were the SEGA Mega Drive, Nintendo Entertainment System (NES), and Super Nintendo Entertainment System (SNES), followed by the Sony PlayStation in the late 1990s. The most popular games in the early 1990s were ports of *Mario Bros.* (1983), *Super Mario Bros.* (1985), *The Legend of Zelda* (1986), and *Sonic the Hedgehog* (1991). Foreign game companies are starting to take an interest in the African market (e.g., international game developer Ubisoft has an office in Casablanca, Morocco), and more recently, there have been games created in the West that are set in Africa, such as *Pamoja Mtaani* (2008), which was developed by Warner Bros. Studios in the United States. The game is about educating the youth on HIV and AIDS and is in Swahili (the native language spoken in Kenya; the game's name translates as "Together in the Hood").

Indigenous video game development started emerging around 2004–6, particularly in the home computer and mobile computing sectors. Countries where video game development is taking root include South Africa, Kenya, and Ghana.

South Africa has a website dedicated to video game development, www.sagamedev.co.za. Small game development studios are emerging in South Africa and are usually linked to an animation company or a company in the entertainment industry. The development of mobile games has also begun. South African game companies include Luma Arcade, the makers of *Mini#37* (2007) and *The Harvest* (2010) as well as mobile games and advergames, and Open-Reset Studios, the maker of *Bounty Arms* (2010).

Ghana does not yet have a video game development community, but one game designer, Eyram Tawia, whose background is in writing comics, has made a three-dimensional home computer game titled *Sword of Sygos* (2005) that is based on Greek mythology.

Kenya, similar to Ghana, also does not yet have a video game development community, although there are people interested in the field. I am the first Kenyan to develop a commercial video game with three-dimensional graphics, and I am the first African to develop a commercial video game with three-dimensional graphics from scratch—that is, developing all the game engines besides the rendering engine (OpenGL/Direct X).

The first video game I developed is called *Adventures of Nyangi* (2007). It took me two years of research and two years of full-time development. I finished the game in 2006 and began selling it in 2007. I sold the game to determine whether there is a market for games I would develop in future. I received a lot of interest in the game. The game was not as complete as I wanted, so I began developing another version of the game; however, I did not complete that version.

I founded Sinc Studios when I was about to complete *Adventures of Nyangi* (2007). There are few game developers in Africa, so it was basically a one-man army. My vision was to develop a full game company. Although I never realized this dream with Sinc Studios, I am working on it now at my new company, Leti Games.

There were other game development studios in Africa before Sinc Studios, but they were all very small (e.g., Eyram Tawia's company in Ghana, which was called BlackSoft Developers, no longer exists). However, Sinc Studios was unique in that I envisioned creating games from the ground up unless there were compelling reasons to use premade game engines, as is the case with the other game development companies that existed. I believed that by understanding the underlying mechanics at all stages of development, Sinc Studios would be in a position to create innovative games.

Sinc Studios was fully funded by me. At a later stage, I gave up some shares for funding. However, the game we planned to develop never took off, and we decided to close the company. This is also the time when I decided to venture into B2B-type software development.

I got to meet Eyram on a blog about the game I had developed. We kept in touch and finally met in 2008. We also met a businessman and game enthusiast who had developed a mobile game, and we all agreed to start a full-time video game development company. We founded the company, Leti Games, in April 2009. So far, we have developed one commercial game for the iPhone titled *iWarrior* (2009) and a mobile phone port of *iWarrior* titled *Kijiji* (2009).

Most of the video games developed in Africa will be on mobile and web platforms. Cutting-edge home computer and console games are expensive to develop and require expertise that is not available in Africa. As of late 2019, South Africa has one of the largest national video game industries on the continent.

Wesley Kirinya

See also: Egypt; South Africa

Further Reading

Leti Games website. Accessed September 1, 2020. Available at http://www.letigames.com.

Luma Arcade website. Available at http://www.lumaarcade.com.

Majtenyi, Cathy. "Pamoja Mtaani Video Game Helps Kenyan Youth Avoid AIDS." *AfricanLoft*, March 5, 2009.

Sinc Studios website. Available at http://www.sinc-studios.com.

Afroes

Afroes, short for African heroes and heroines, is a digital gamification and technology company that creates and distributes uniquely African mobile games, applications, and solutions for social agencies, brands, corporate enterprises, and governments. Afroes produces gamified solutions and content targeted at youth that contain fun and interactive educational and social messaging as stand-alone commercial products and as a service to clients and campaigns.

Afroes was founded as Afroes Transformational Games in 2009 by Anne Githuku-Shongwe, who was inspired by conversations with her children. She worried that they were not being exposed to any positive African media content and that their ideas and aspirations for Africa were being influenced by the Western media's pervasively negative messages about the continent. She wanted to do something to change that. But it was while she observed her son excitedly relating things he had learned while playing the computer game *Civilization* (1991) that she realized children who play computer games are a captive audience for anything you want to teach them. She knew from that point onward that she needed to harness the power of games to deliver positive messages to African children.

Enabling its partners and clients to be innovative and locally relevant, Afroes engages and reaches users through unique learning experiences on mobile devices, the most widespread gaming and networking platform in Africa. All products are designed to generate useful data and reports that help clients make informed decisions about future engagements. The content is created, tested, and distributed digitally as well as through a unique network of local youth representatives, known as Mobiv8ors (mobile motivators), who know their market and are incentivized to ensure maximal reach.

ENTERPRISE GAMIFICATION

Afroes builds gamification learning solutions for corporations and brands, delivering on business objectives related to youth customers. The company's gamified solutions are designed to encourage increased motivation and engagement of users in otherwise mundane activities, enhancing learning through the experiential nature of gaming and engendering behavioral change. Afroes is currently involved in the gamification of financial literacy for clients.

GAME DEVELOPMENT AND MOBILE SOLUTIONS

Afroes has worked with governments and social agencies to develop a suite of interactive and gamified mobile products targeting young people and has produced a series of award-winning mobile and web gaming titles that address issues such as child protection, environmental rights, and gender violence. Young people who then become advocates among their peers actively spread the games.

RESEARCH AND ANALYTICS

Recognizing the need for rigorous and grounded research designed to address underlying social or business challenges, Afroes passionately pursues people-centered research and attempts to understand the youth market and their context. Such information is used to comprehensively understand clients' industries and the environments in which they operate to design effective products.

COMMUNITY ENGAGEMENT AND DISTRIBUTION

Afroes' design process is engaged with the community, with each solution undergoing a process of outreach with the target market in multiple geographies. Focus groups and research sessions are held by facilitators to understand user needs and motivations. Such community presence and understanding is leveraged to distribute finished products deep into communities.

As of 2019, Afroes has created a series of mobile games designed to shape new choices and stimulate challenging conversations for children and young people in Africa. *Champchase* (2010) is a game that addressed child protection in the run-up to the 2010 World Cup in South Africa. *Moraba* (2011) is an award-winning mobile game that addresses difficult questions about gender-based violence and challenges the user to contemplate what she or he believes about sexual relations and sexual violence. The game provides valuable information to users, empowering them to make informed choices. The *Haki* series features *Haki: Shield and Protect* (2012), a game designed to raise awareness of environmental protection, and *Haki II: Chaguo Ni Lako* (*Justice: The Choice Is Yours*) (2013), a game designed to inform, inspire, and empower Kenyan youth and help them to make considered choices as they went to the polls in 2013. Most recently, as part of the Rockefeller Digital Jobs Africa, *JobHunt* (2015) was produced to raise awareness of digital jobs as an income opportunity for young Africans.

The company's mission and vision is to inspire, empower, and equip young Africans with twenty-first-century skills that will positively impact their lives and the lives of their communities. Through gamified solutions, Afroes encourages increased motivation and the engagement of users in otherwise mundane activities, enhancing learning through the experiential nature of gaming and engendering behavioral change. Some of the awards won by Afroes include the PEACEapp Global Competition on games for intercultural dialogue and conflict prevention 2015 award; the Gender Youth and Vulnerable Groups ICT Innovation Award, Kenya 2014; finalist of World Technology Awards from *Time*, *Fortune*, and CNN, 2013; the World Economic Forum Schwab Social Entrepreneur of the Year Award, 2013; the World Youth Summit Award, Montreal, October 2012; MEFFYs Award, London, September 2012; NETEXPLO Award, France, March 2012; finalist of Mobile Premier Award, Barcelona, 2012; finalist of AppCircus Award, August 2011; fellow nomination of the Unreasonable Institute, 2011; and the Cartier Women's Initiative Award, France, 2010.

Anne Githuku-Shongwe and Gathoni Mwai

See also: Githuku-Shongwe, Anne

Further Reading

Afroes website. Available at http://afroes.com/ (site discontined).

"Anne Githuku-Shongwe: Visionary Creator of Mobile Phone Edu-Tainment for Young Africans." Lionesses of Africa. Accessed September 1, 2020. Available at http://www.lionessesofafrica.com/lioness-anne-githuku-shongwe/.

Ernest, Gracious. "Women at Afroes: Anne and Gathoni Are Leading the Mobile Gamification Path." She Leads Africa. Accessed October 11, 2020. Available at https://sheleadsafrica.org/afroes/.

Ndemo, Bitange, and Tim Weiss. "Changing the Game: Building Mindsets of Hope and Possibilities in Africa's Future Leaders—One Game at a Time." In *Digital Kenya: An Entrepreneur Revolution in the Making*, edited by Bitange Ndemo and Tim Weiss, 85–94. London: Palgrave MacMillan, 2017. Available at https://bit.ly/2Seu3Hz.

Schwab Foundation for Social Entrepreneurship. "Anne Githuku Shongwe." Accessed September 1, 2020. Available at https://www.schwabfound.org/awardees/anne-githuku-shongwe.

AI. *See* Artificial Intelligence

Angry Birds

Angry Birds is a media franchise centered on a series of video games produced by the Finnish company Rovio Entertainment that includes *Angry Birds* (2009), *Angry Birds: Space* (2012), *Angry Birds: Star Wars* (2012), *Angry Birds 2* (2015), and many others. The franchise was an early runaway success on Apple's iPhone, taking advantage of a low price point, simple mechanics, and the increasing ubiquity of smartphone devices to reach audiences unavailable to console and PC game publishers. Since the first game's success in 2009, the franchise has expanded to include a number of sequels, spin-off titles, merchandise, movies, television shows, comics, and a theme park.

The thin narrative framing of the franchise centers on the titular angry birds trying to rescue their eggs from (and dish out revenge on) the green pigs. The original game that started the franchise is relatively straightforward: the player holds the mobile phone in a landscape position and uses a finger to pull back and aim a giant slingshot in which one of the birds is placed. When the player lets go, the bird is flung out toward the opposing pigs housed in flimsy structures. The games use basic physics simulation to ensure nearly every shot the player makes causes some level of spectacular damage. The player has a finite number of birds, each with their own special abilities, and must figure out how best to use these birds to cause the maximum damage. If the player depletes the birds without destroying all the pigs, the player fails the level and must try again.

Once all the pigs are destroyed on a level, the player gets bonus points for each bird remaining and a ranking of up to three stars based on the overall score. This encourages two different styles of play. The first is a very casual style, where players simply attempt to finish a level and move on to the next. The second is a more disciplined and difficult approach, where the player combines accuracy and weak points in the structures to aim for the three-star ranking on every level.

Angry Birds' mechanics have precedent, most notably *Castle Clout* (2008) by Liam Bowmers and *Crush the Castle* (2009) by Joey Betz and Chris Condon, each of which were browser-based Flash games made by Armor Games. A number of indie developers criticized Rovio for simply "cloning" the mechanics of these earlier, lesser-known games. However, it is important to consider the particular innovations *Angry Birds* made that contributed to its success and that exemplified the rise of casual and mobile games in the following decade.

ANGRY BIRDS
BY ROVIO ENTERTAINMENT LTD.
MULTIVITAMIN
DRINK
ANGRY BIRDS
BY ROVIO ENTERTAINMENT LTD.
GREEN APPLE
ANGRY BIRDS
BY ROVIO ENTERTAINMENT LTD.
APPLE & CHERRY
DRINK

***Angry Birds* drink cans. (Dean Bertoncelj/Dreamstime.com)**

As browser games, *Castle Clout* and *Crush the Castle* required the player to sit at a computer, load a website, and use the mouse cursor to draw back and aim a trebuchet. As a game on a mobile device, however, *Angry Birds* is always close by the player, and it has an intuitive control scheme via the touchscreen. The *Angry Birds* player does not need to commit to playing *Angry Birds* but can simply pull it out at the bus stop, during a commercial break, or on the toilet and play a couple of quick levels. Further, the *Angry Birds* player does not need to learn how to play *Angry Birds* before he or she can play the game. The player can just flick the birds and be immediately rewarded with the spectacle of crashing towers; this change in platform and input means is not trivial.

Furthermore, *Castle Clout* and *Crush the Castle* were presented as very traditional medieval games of two battling armies. While this visual aesthetic was appropriate for the primarily young male demographic playing online browser games, replacing this “skin” with exaggerated cartoon birds, bright colors, and comical sounds made *Angry Birds* more approachable to a far broader and diverse audience.

Angry Birds thus perfectly exemplifies what Jesper Juul called in his book *A Casual Revolution* (2009) the rise of casual games as a significant aspect of the video game field that fundamentally challenged core values and understandings of video game design conventions. It focused on flexibility over immersion, accessibility over difficulty, and polished spectacle over narrative depth. In doing so, it reached a level of cultural ubiquity obtained by only a small handful of video game franchises.

While the first *Angry Birds* game in the series released for $1 on Apple’s App Store, later games took advantage of the trend toward microtransactions. They would be released for free, encouraging players to give them a go, and then offer digital items for sale within the game, such as more powerful birds or the ability to unlock more levels. As the series became more popular and culturally ubiquitous, it expanded its reach through franchise crossovers, such as the *Angry Birds* games branded with characters and environments from other popular franchises, such as Star Wars, and through extensive merchandising, such as action figures, plush toys, and clothing.

There is no shortage of video game franchises that are immensely popular, but far fewer franchises reach a level of cultural ubiquity where they are well known even to those that do not play the video games in question. Mario is one such franchise, as is Pokémon. *Angry Birds* is another. While the fact that it is a "casual" game and a "mobile" game often sees it derided and dismissed in discussions of the core canon of video games, *Angry Birds*' ability to quickly reach such a high level of cultural saturation makes it foundational and crucial to considerations of video games as part of popular culture.

Brendan Keogh

See also: Casual Games

Further Reading

Juul, Jesper. *A Casual Revolution: Reinventing Video Games and Their Players*. Cambridge, MA: MIT Press, 2009.

Keogh, Brendan. "Paying Attention to *Angry Birds*: Rearticulating Hybrid Worlds and Embodied Play through Casual iPhone Games." In *The Routledge Companion to Mobile Media*, edited by Gerard Goggin and Larissa Hjorth, 267–275. New York: Routledge, 2014.

Animal Crossing Series

The games in the *Animal Crossing* series are developed by Nintendo EAD. As of early 2020, the series includes ten titles, with the latest, *Animal Crossing: New Horizons*, released in March 2020. Previous titles in the series include the following:

- *Animal Crossing*, the 2002 Nintendo GameCube title (the Japanese version, *Doμbutsu no Mori*, was released in 2001 for the Nintendo 64)
- *Animal Crossing-e*, a series of Nintendo e-Reader cards for the Game Boy Advance
- *Animal Crossing: Wild World* (2005) for the Nintendo DS
- *Doμbutsu no Mori*, the 2006 film based on the game series and directed by Jomjin Shimura (exhibited only in Japan)
- *Animal Crossing: City Folk* (2008) for the Nintendo Wii
- *Animal Crossing: Happy Home Designer* (2015) for Nintendo 3DS
- *Animal Crossing: Amiibo Festival* (2015) for WiiU
- *Animal Crossing: Welcome Amiibo* (2016)
- *Animal Crossing: New Leaf* (2012)

- *Animal Crossing: Pocket Camp* (2017) for iPhone and Android

Animal Crossing
New Horizons

A Nintendo Switch game console showing *Animal Crossing: New Horizons*. (Info849943/ Dreamstime.com)

The *Animal Crossing* games are social networking games that emphasize interactions between non-player characters (NPCs) and other players. There is also a strong emphasis on collecting and purchasing numerous game items with game currency. The games are set in a village of animal characters. The player is a human character that moves into the village and interacts with the NPCs. There are anthropomorphic dogs, cats, eagles, tigers, octopuses, and more that move in and out of the village. If the player does not interact with a particular character, it will eventually become dissatisfied and move away. Game activities include catching fish and insects, collecting shells, pulling weeds, planting flowers and trees in the village, digging up fossils, talking to neighbors, buying and selling furniture and other items, and participating in seasonal events. Although there are a number of suggested goals in the game, players are not required to complete any of them.

When the player begins some of the *Animal Crossing* games, he or she needs a place to stay in the village. The local merchant, Tom Nook, offers to loan the player the money needed to purchase a house. Because the player begins the game with no money, this means taking on mortgage debt. Tom Nook loans the player the necessary money but insists the player work in his store to begin paying off the debt. This period of servitude is used to introduce the player to the game world and characters. After it is completed, much of the debt still remains, but Nook allows the player to pay it back slowly (or even not at all). In addition to sending letters and talking to the other characters, the player is often asked to perform certain tasks, such as returning a borrowed item or catching a certain kind of fish or insect. Upon completion of the task, the player receives a gift of bells (the name of the in-game currency), stationery, clothing, or furniture. The player is also invited to donate items to the village museum, called the Farway Museum, and participate in a number of holiday celebrations, festivals, and other events. The variety of items in the game is surprisingly vast, and the kind of player to whom this game appeals is one who enjoys finding new clothing designs or new kinds of furniture. There is no way to win the *Animal Crossing* games, and thus the game is potentially never-ending.

One of the game activities is to catch and collect the myriad insects, fossils, fish, and paintings available in the game. These items can be donated to the town museum, sold to Tom Nook, or used to decorate the player's house. The curator of the Farway Museum is an owl named Blathers. The museum has four wings devoted to displaying fish, insects, fossils, and paintings, which players can peruse and interact with as they gradually fill out the displays. Completing the museum makes the town more attractive to visitors. Although the Farway Museum only accepts a limited number of objects, players can furnish and decorate their house with any of the thousands of items available in each *Animal Crossing* game. Each player has a house that can be expanded to have several different rooms. The player can choose the carpet and wallpaper for each room and install furniture, pictures of the other characters, and myriad other items.

There is an organization called the Happy Room Academy (HRA) that judges the player's arrangement of furniture and assigns the furniture layout a certain number of points. After achieving a house design of seventy thousand points, the HRA gives the player a House Model, and on reaching one hundred thousand points, the player receives a Manor Model. These are miniature models of village locations given as a reward for winning competitions or completing special tasks. The HRA encourages matching items by color or design, but there are also luck items, such as the Mario Trophy, that bring the player good luck during game events when displayed in the player's house. Additionally, by arranging items according to a simplified feng shui philosophy, the player will earn more points from the HRA and have better luck obtaining bells and other items.

The games are rated E (Everyone) and are suitable for all ages. The only skill requirement is an elementary school reading level, but the games are notable for their appeal to both teens and adults. *Animal Crossing* games operate in real time, meaning that an hour of game time takes an hour of real time to play, and time continues to pass in the game world even when the game is turned off. The seasons also change accordingly.

One of the defining characteristics of the *Animal Crossing* games is their emphasis on social interactions between players and game characters. Ian Bogost has noted that "like *The Sims* (Maxis, 2000), *Animal Crossing*'s primary metaphors are social interaction and household customization" (Bogost 2004, 10). The games are often categorized as social simulation games as a result. Nintendo promoted the series as "communication games" because much of the gameplay consists of talking or writing letters to the characters in the game. For Bogost, the *Animal Crossing* games are also an example of an "asynchronous multiplay" game, in which multiple players participate in the same game but not at the same time. The game world continues to change even while a particular player is not playing. The multiplay aspect of *Animal Crossing* is optional but strongly encouraged in the game. For example, the NPCs will often complain about wanting to meet new people if the same player's character is consistently the only one they interact with. If a particular player has not used *Animal Crossing* for a while, the NPCs will ask about them by name to any players who do continue to play.

Jesper Juul also observes that the social relations between players is one of the unique features of the series; "although only one player can play the game at a time, it allows members of a family (for example) to play at different times but then to send messages and gifts to each other, which are received the next time a recipient plays" (Juul 2009, 123). Juul discusses the short Korean animation *Animal Crossing Is Tragic* (LoLiel 2005) as an example of a meaningful emotional experience catalyzed by the *Animal Crossing* game. This short cartoon tells the story of how the narrator introduced his mother to *Animal Crossing* because she was largely housebound as a result of illness. The mother spends hours playing the game and locating items she can mail to her son's character through the *Animal Crossing* post office. After the mother dies, the narrator returns to *Animal Crossing* to find his character's mailbox full of letters and gifts from her. As Juul has observed, this system of messaging and gift giving in the *Animal Crossing* games means that much of the meaning is derived from the context of the players' lives. Because individuals play the game at different times, it means the mother in this example can send messages to her son "from beyond the grave, so to speak" (Juul 2009, 124). This gives the messages an emotional resonance that is dependent on the specific circumstances of the players' lives. The *Animal Crossing* games have active fan communities where players interact with each other, trade game secrets, exchange passwords to visit each other's villages, make new friends, and discuss issues related to the game. Many of these fan communities are based around websites, such as *Animal Crossing Ahead* and *Animal Crossing Community*.

Features of the original *Animal Crossing* include the ability to put a second data card in the GameCube, allowing the character to visit the villages of friends. Players with a Game Boy Advance and GBA cable can visit Animal Island and obtain fruit, items, and clothing not otherwise available. One of the in-game items is a Nintendo Entertainment System (NES). With the in-game NES, the player can find and play old NES games, such as *Donkey Kong* (1981), *Balloon Fight* (1984), and more. The e-Reader scanner can be hooked up to the Game Boy Advance. The series of *Animal Crossing* e-Reader cards provide access to even more unique items.

In *Animal Crossing: Wild World*, the Wi-Fi capabilities of the Nintendo DS allowed Nintendo to expand the communication elements in the game. In *Wild World*, players can visit other villages from anywhere in the world by setting up Wi-Fi access and getting an invite code from a friend. The game includes some new locations, such as the Roost (a coffee shop in the basement of the Farway Museum) and the Observatory. The game features even more collectible items and furniture than the previous version.

Animal Crossing: City Folk added a city location. The player can now take a bus from the village to the city, which has shops with more expensive items available for sale, a beauty salon, an auction house, a fortune-teller, the Happy Room

Academy main office, and a theater. The player character can get a makeover to look like his or her Wii Mii. Using the Wii Speak microphone allows players in different locations to chat with each other live while playing the game.

Animal Crossing: Happy Home Designer is a spin-off from the main *Animal Crossing* series and downplays the social interaction element the series is known for. It operates as more of a sandbox game focused on designing houses for animal characters based on their specifications.

Animal Crossing: Amiibo Festival is a virtual board game that incorporates the toys-to-life game element in the *Animal Crossing* world. Amiibo figures of various Nintendo characters contain near-field communication protocols. When the amiibo comes in close proximity (approximately 1.5 inches) to a Wii U, 3DS, or Switch running a compatible game, it can be used to save game data and access new game content. Amiibo are required for *Amiibo Festival,* unlike other *Animal Crossing* games, where they are used for bonus content.

Animal Crossing: Pocket Camp is a free mobile app with in-game purchase options. Gameplay takes place at a campsite instead of a village in this spin-off, but the focus remains on gathering materials, decorating, and interacting with NPCs and other players.

Animal Crossing: New Horizons was released on March 20, 2020, for the Nintendo Switch. This game is similar to *Animal Crossing: Pocket Camp*, with an emphasis on crafting new items from material collected on the island. Reviewers have noted that *New Horizons* is potentially helping people cope with COVID-19-related stress because gameplay takes place on a "much happier, safer island" (Wynne 2020).

Kara Lynn Andersen

See also: Nintendo; Non-Player Characters; Social Media

Further Reading

Animal Crossing Community website, 2019. Available at http://www.animalcrossingcommunity.com/acchome.asp.

Bogost, Ian. "Asynchronous Multiplay: Futures of Casual Multiplayer Experience." Other Players Conference, Center for Computer Games Research, IT University of Copenhagen, Denmark, December 6–8, 2004.

Bogost, Ian. "Procedural Literacy: Problem Solving with Programming, Systems, & Play." *Telemedium* (Winter/Spring 2005): 32–36.

Carvalho, L., and M. Eler. "Security Requirements for Smart Toys." In *Proceedings of the 19th International Conference on Enterprise Information Systems* (ICEIS 2017), vol. 2, 144–154. Available at https://pdfs.semanticscholar.org/9cae/d7dc05c58ae1886aaad9e0f31f8ba3d36b67.pdf.

Donato, Al. "Mobile Madness: How Animal Crossing Made Me Actually Do Self-Care." *Broken Pencil* 78 (2018): 9.

Juul, Jesper. *A Casual Revolution: Reinventing Video Games and Their Players*. Cambridge, MA: MIT Press, 2009.

Kelley, Heather. "Animal Crossing: A Game in Time." In *Space Time Play: Computer Games, Architecture and Urbanism: The Next Level,* edited by Friedrich von Borries, Steffen P. Walz, and Mattias Böttger, 180–181. Basel, Switzerland: Birkhäuser, 2007.

Kim, Jin. "Interactivity, User-Generated Content and Video Game: An Ethnographic Study of Animal Crossing: Wild World." *Continuum* 28, no. 3 (2014): 1–14.

LoLieL. "Animal Crossing Is Tragic." *The Black Onion Brigade*, 2005. Available at http://loliel.egloos.com/2023210.

Nansen, B., B. Nicoll, and T. Apperley. "Postdigitality in Children's Crossmedia Play: A Case Study of Nintendo's Amiibo Figurines." In *The Internet of Toys: Studies in Childhood and Youth*, edited by G. Mascheroni and D. Holloway, 89–108. Cham, Switzerland: Palgrave Macmillan, 2019.

Sakamoto M., and T. Nakajima. "The GamiMedia Model: Gamifying Content Culture." In *Cross-Cultural Design, CCD 2014, Lecture Notes in Computer Science*, vol. 8528, edited by P. L. P. Rau, 786–797. Cham, Switzerland: Springer, 2014.

Wynne, Kelly. "'Animal Crossing: New Horizons' Is Great for Your Mental Health through COVID-19, Professionals Say." *Newsweek*, March 23, 2020. Available at https://www.newsweek.com/animal-crossing-new-horizons-great-your-mental-health-through-covid-19-professionals-say-1494525.

Animation (Computer)

While practically all video games have graphics controlled by a computer, they have changed greatly over the years as computer animation has grown and developed. Although movies and video games provide economic motivation for the continuing development of computer graphics, the graphics used in video games will always lag behind those of movies because games require graphics to be animated in real time, whereas graphics used in movies can be rendered with as much time as needed. Despite this, the computer animation used in games has become quite sophisticated and continues to advance.

The earliest games, such as *Spacewar!* (1962) and *PONG* (1972), had graphics made up of points, lines, and blocks, which resulted in relatively simple imagery. Throughout the 1970s, the computer graphics industry grew, spurred on by the scientific community as well as sectors of the entertainment industry, such as filmmaking, which was beginning to integrate computer graphics into movies.

Arcade games usually had fast action to take in as many quarters per hour as possible, whereas home games, which were purchased outright, could feature slower-paced games and attempt more graphically. In general, most early games featured two-dimensional fields of pixel-based raster graphics with moving objects (made up of small bitmaps known as *sprites*) that depicted players' avatars, vehicles, or projectiles. While the earliest games had their entire game world contained on-screen, some games, beginning with Atari's *Super Bug* (1977), *Fire Truck* (1978), and *Football* (1978), began to feature playfields that extended off-screen and scrolled on and off the screen as needed (see also Scrolling), allowing for much larger game worlds.

In the 1980s, starting with such games as *Jump Bug* (1981) and *Moon Patrol*

(1982), multiple two-dimensional layers of overlaid graphics were moved at different speeds, creating parallax scrolling, which could make the game imagery appear more three dimensional. Some games, such as *Zaxxon* (1982) and *Crystal Castles* (1983), had isometric graphics that gave the appearance of dimensional game worlds when they were in fact flat.

Three-dimensional graphics, often used to create a first-person point of view, had been around since the mainframe games *Maze War* (1973) and *Spasim* (1974) and were later used in arcade games such as *Battlezone* (1980) and *I, Robot* (1984). As the computations necessary for three-dimensional computer animation required more processing power, the earliest games to feature three-dimensional graphics were relatively simple graphically and would not be able to compete graphically with sprite-based games that simulated three-dimensional scenes (e.g., *Pole Position* [1982] and *Space Harrier* [1985]) until the end of the 1980s with games such as *S.T.U.N. Runner* (1989), which had three-dimensional filled-polygon graphics.

By the early 1990s, three-dimensional graphics were becoming more common, and they were either pre-rendered (as in *Myst* [1993]) or rendered in real time (as in *Doom* [1993]). Throughout the 1990s, computer animation in video games began to incorporate higher geometric resolutions, more subtle shading and lighting effects, and texture mapping, all of which allowed for more detail and more realistic representations. Although this made games more immersive, it also led to controversy over realistic-looking game violence, such as that found in *Mortal Kombat* (1992). Some games also used photographic material within game imagery as bitmaps for such things as textures and character designs.

Game engines also grew more sophisticated, allowing more physics simulations to be animated in real time. A variety of different game engines, including the Quake Engine (1996), Unreal Engine (1998), the Havoc SDK (2000), CryEngine (2002), and their sequels, have been used to create more realistic physics effects in video games, including such things as collision detections, simulated gravity, explosions, cloth movement, lighting and shadow effects, smoke, fire, dynamic fluid effects, and more. With more memory and faster processing times, game engines are able to deliver an increasing degree of realism, not only in the way things look but also in their physical behavior, reactions, and interactions, and all in real time. The real-time nature of video game computer animation limits the amount of calculation used to produce the imagery, which keeps game graphics lagging behind imagery for which there is no rendering time limit. Furthermore, the rendering of graphics and calculation of physics and object behavior also compete for processing power and time with an increasing number of other demands, such as the artificial intelligence algorithms used to run non-player characters (NPCs), adaptive music that adjusts in real time to game events, and sound effects that are also generated by game events.

Computer graphics used for mathematical visualizations continue to make their way into video games as well. The game engine used for the forthcoming experimental game *Miegakure* is designed to show three-dimensional sections of a four-dimensional game space, demonstrating that there are still many possibilities for the application of new computer animation techniques to game design.

Mark J. P. Wolf

See also: Animation (Hand-Drawn); Dimensionality; Game Engines

Further Reading

Cooper, Jonathan. *Game Anim: Video Game Animation Explained*. Natick, MA: A. K. Peters/CRC Press, 2019.

Kuperberg, Marcia. *Guide to Computer Animation: For TV, Games, Multimedia and Web*. Oxford, UK, and New York: Focal Press, 2012.

Animation (Hand-Drawn)

Although they are produced on-screen through the use of electronics and computers, video game graphics, especially in earlier times, heavily relied on hand-drawn animation techniques before three-dimensional computer-generated animation became widespread, and even afterward, it has remained in use as a stylistic option.

Early games had very simple graphics, mainly blocks and dots, or simple geometric shapes, such as the spaceships in *Spacewar!* (1962), which were known as the “needle” and the “wedge” due to their shapes. As the capabilities of video game graphics improved during the mid to late 1970s, in the arcade and in the second generation of home console systems, graphics began to depict game vehicles and characters, which were designed by hand on graph paper. Characters and moving objects were typically represented by sprites, which were small bitmaps of usually eight-by-eight pixels or larger. Not only did characters and objects need to be designed to have recognizable features, but they had to be designed in multiple positions to indicate actions such as running or fighting. A series of poses would be hand-drawn, depicting such things as a character’s walk cycles, which could be used repeatedly and linked to other series of actions. The drawings would then be simplified and transferred to graph paper, where they would be adjusted to fit the low resolution and limited color palettes available. The fewer pixels available, the more care had to be taken to make the image and actions as recognizable as possible despite the limitations present.

As graphics capabilities continued to improve through the 1980s and 1990s, characters and objects could be depicted with greater resolution and more colors, resulting in images detailed enough to represent more refined designs and movements. Images could be drawn and scanned in or drawn with a stylus on a graphics tablet. Jordan Mechner’s *Karateka* (1982) and *Prince of Persia* (1989), for the Apple II, were among the first games with rotoscoped characters, an animation technique patented by Max Fleischer in 1915 in which hand-drawn images are traced from live-action film footage as a reference. Laserdisc games used pre-rendered imagery and thus had graphics superior to other arcade games, but at the cost of greatly reduced interactivity. Laserdisc arcade games such as *Dragon’s Lair* (1983) and *Space Ace* (1994) used sequences of hand-drawn animation as their graphics and switched between them based on the player’s reactions, which resulted in games that required precise timing while offering very little interaction, a combination that frustrated players and doomed laserdisc games.

Better spatial and color resolutions allowed animation graphics to be drawn in a wider range of styles. Konami's arcade game *The Simpsons* (1991) depicted its characters in the same drawing style as the television series, and some home computer games, such as Lucasfilm Games' *Maniac Mansion* (1987), *Day of the Tentacle* (1993), and the *Monkey Island* series, had graphics in cartoonish drawing styles that ranged from those of animated films to hand-drawn comic strip characters. Likewise, many Japanese games have anime-styled game graphics that appear visually similar to manga (comic books) and animated films of the culture.

Just as some retrogames are made to look graphically like games from earlier systems, with limited color palettes and lower resolutions, some art games are deliberately stylized to mimic earlier graphical drawing styles. *Cuphead* (2017), a run-and-gun independent game, is carefully designed to look like the 1930s color hand-drawn cel-animated theatrical cartoons, particularly those of the Disney, Fleischer, and Van Beuren Studios. The game not only uses the same period drawing style for its characters and backgrounds, but the fonts, music, and animation style also mimic the early cartoons; the images are beset with the scratches, hairs, dust, and other artifacts commonly experienced on-screen during projected films. The game's action also reproduces the animation style of the 1930s, which still included such devices as speed lines, shock lines, and puffs of smoke to emphasize actions such as impacts and explosions (conventions that attempted to evoke movement in the images of comic strips and were adopted by early animated films). Thus, video games can simulate both the graphic drawing styles as well as a film look and the animation styles of various animators or studios, imbuing games with the spirit of their graphical influences.

Attempts have been made to simulate the warmth and organic feel of hand-drawn animation, even in games that have three-dimensional computer-generated objects and characters. Games such as *Jet Set Radio* (2000), *Viewtiful Joe* (2003), and *The Legend of Zelda: Breath of the Wild* (2017) use algorithms to produce a posterized look that emulates cel-shaded animation, though with varying results based on the techniques used. Other factors, such the complexity of the scenes depicted and perspectival movement through three-dimensional spaces, will often reveal the computer-animated nature of a game, as such things would be too difficult to do by hand.

As much character, object, and location design in video games still originates with an artist drawing designs on paper, we can expect hand-drawn images and animation to have a continuing influence on the ever-increasing breadth of the graphical design and gameplay of video games.

Mark J. P. Wolf

See also: Animation (Computer); *Cuphead*

Further Reading

Fisher, Jessica. "Delight Your Eyes with These 5 Hand-Drawn Video Games." Geek & Sundry, April 17, 2018. Available at https://geekandsundry.com/delight-your-eyes-with-these-5-hand-drawn-video-games.

Porges, Seth. "How the Original 'Prince of Persia' Changed Video Game

Animation." *Forbes*, December 19, 2017. Available at https://www.forbes.com/sites/sethporges/2017/12/19/how-the-original-prince-of-persia-changed-video-game-animation/#68cc6fc13f6d.

Swearingen, Jake. "Cuphead: The Admirable Lunacy of Hand-Animating a Video Game in 2017." *Intelligencer Magazine,* September 29, 2017. Available at http://nymag.com/intelligencer/2017/09/the-admirable-lunacy-of-hand-animating-a-video-game-in-2017.html.

Apocalypse

Many of today's violent video games exhibit remarkable structural similarities to ancient Jewish and Christian apocalypses. Both video games and apocalypses are types of imagined otherworldly journeys, often with an interest in portraying events of the end-times. Indeed, we can readily view video games as the most poignant site for contemporary renegotiation of the apocalypse genre.

In 1979, specialists in the Society of Biblical Literature produced for the first time a definition of *apocalypse* to set the stage for the analysis of dozens of ancient Jewish and Christian texts, most of which did not make it into the Bible but were clearly important for communities living around the turn of the first millennium and suffering under Roman oppression. The definition marks an *apocalypse* as a type of narrative revealed by God, mediated by an otherworldly being, and received by a human recipient, disclosing "a transcendent reality that is both temporal, insofar as it envisages eschatological salvation, and spatial, insofar as it involves another, supernatural world" (D'Angelo 2019, 19). That is, apocalypses involve supernatural figures that guide the human through the otherworldly journey, and they are often preoccupied with the defeat of enemies in a cataclysmic judgment.

For example, in the noncanonical Jewish apocalypse *The Book of the Watchers* (probably second century BCE), a seer goes on a journey across the heavens and regions of future punishment and acquires heavenly knowledge through questions asked of an otherworldly mediator. Enoch sees "the stars and the lightnings" speeding by as "the winds in the vision caused me to fly and lifted me upward, and bore me into heaven," where he sees "a wall which is built of crystals and surrounded by tongues of fire" and "a tesselated floor (made) of crystals." On the ceiling, he sees "fiery cherubim" (1 Enoch 14). Later, he sees the gruesome punishment awaiting those who oppose God's will—a deep abyss of searing flame and torture.

Like apocalypses, video games invite players into a "world" accessible only through a video game platform. In video games, an "otherworldly mediator" often guides the player through tutorials, offers helpful hints at crucial moments, and helps the player achieve his or her goals in the game: for example, Link in the *Zelda* series and Cortana in the *Halo* series. Games even exhibit the characteristic dualisms of apocalypses in their frequent representation of the player protagonist in a battle against fierce and deadly opponents with ultimate consequences. Apparently recognizing the rich potential of ancient apocalypses for video games, Ignition Entertainment is currently working on a video game based precisely on the otherworldly journeys of Enoch in *The Book of Watchers*.

Apocalypses and video games also both exhibit a form of what Ian Bogost calls "procedural rhetoric," those "processes [that] define the way things work: the methods, techniques, and logics that drive the operation of systems" (Bogost 2007, 3). In Jewish and Christian apocalypses, God is the "programmer," and his "logics" are understood through apocalypses, which provide an ideological template for how to understand life on earth under Roman rule. The procedural rhetoric of apocalypses encourages readers to wait for God's imminent intervention in human life and his victorious and likely violent destruction of their enemies. The passivity encouraged for ancient hearers of apocalypse is one of the most marked differences between these ancient stories and today's games. The occasional Jewish or Christian apocalypse does depict human beings enacting judgment, but more typically, it is *God*, not humans, who is in control of salvation and will intervene to end his people's suffering at the hands of their enemies. In other words, if there is a final showdown with weapons and huge explosions, it will be God pulling the trigger, not us.

By contrast, in video games, agency is situated squarely with the player, who may rely on guides for assistance but ultimately enacts salvation by himself or herself, often in dramatically violent form. We even see this contemporary shift in *Left Behind: Eternal Forces* (2006), a Christian-produced computer game. Despite its assumption of God as in charge of the unfolding end of the world, in *Left Behind*, it is up to *humans alone* to enact his charge on earth. The same human-powered messianic impulse is evident in almost all first-person shooting games, perhaps because in many video games there is no overarching divine power. Instead, the player is a singular messianic figure called on to save the world.

What can we make of this important difference? Ancient apocalypses were probably not read as games and thus had a lot more ideological teeth. By depicting the cosmos as subject to God's rules and shaped by God's own predetermined design, apocalypses can be viewed as the *ultimate* game shaped by the *ultimate* procedural rhetoric. This means that for these Jews and Christians, there was only one "world" to save—our own—and God is the hero holding the gun. In today's video games, we are more likely to see ourselves as imagined gods in control of our own fate. We are also more likely to see the world that we save in virtual space as of no real consequence to our daily lives. For most secularized game players today, neither the imagined apocalyptic spaces of antiquity nor the virtual spaces of video games have any necessary bearing on our off-line lives, which are markedly less certain, less fated, and less scripted.

Rachel Wagner

See also: Death and Resurrection

Further Reading

Aune, David. "Understanding Jewish and Christian Apocalyptic." *Word and World* 25, no. 3 (2005): 233–245.

Bogost, Ian. *Persuasive Games: The Expressive Power of Videogames*. Cambridge, MA, and London: MIT Press, 2007.

Collins, John J. “Introduction: Towards the Morphology of a Genre.” *Semeia* 14, no. 1 (1979): 1–20.

D’Angelo, Mary R. “The Sobered Sibyl: Gender, Apocalypse, and Hair in Dio Chrysostom’s *Discourse I* and the *Shepherd of Hermas.*” In *The End of the World in Medieval Thought and Spirituality*, edited by Eric Knibbs, Jessica A. Boon, and Erica Gelser, 19. Cham, Switzerland: Palgrave MacMillan, 2019.

Himmelfarb, Martha. *Ascent to Heaven in Jewish and Christian Apocalypses*. Cary, NC: Oxford University Press, 1993.

Wagner, Rachel. *Godwired: Religion, Ritual and Virtual Reality*. New York: Routledge, 2011.

Wardrip-Fruin, Noah, and Pat Harrigan, eds. *First Person: New Media as Story, Performance, and Game*. Cambridge, MA, and London: MIT Press, 2004.

Wolter, Michael. “‘Revelation’ and ‘Story’ in Jewish and Christian Apocalyptic.” In *Revelation and Story: Narrative Theology and the Centrality of Story*, edited by Gerhard Sauter and John Barton, 127–143. Surrey, England: Ashgate, 2000.

Apple Bandai Pippin

The Apple Bandai Pippin was a fifth-generation home video game console that was released in 1996 and discontinued only a year later, in 1997, after only selling around forty-two thousand units. The console was developed by Apple and manufactured by Bandai Digital Entertainment Corporation in Japan. The system’s name was based on the Apple Pippin platform, a variation on Apple’s Macintosh platform (thus, it is named after a different type of apple). Apple did no marketing for the Pippin; it was expected that the licensees would take of care of that, and they were also not allowed to use the word *computer* because of Apple’s concern that the product might be confused with Apple computers, even though the Pippin had no hard drive. The console was thus an example of too little, too late, as it appeared after its more powerful competitors: the 3DO Interactive Multiplayer (1993), the Atari Jaguar (1993), the SEGA Saturn (1994), and the Sony PlayStation (1994) had already been released and become established (with the Nintendo 64 about to appear later in the year) and had more games available for them. When the Pippin was released in the United States, there were only eighteen games and applications available for it. To make matters worse, the Pippin’s $599 price tag was much higher than all but one of its competitors, in some cases by several hundred dollars (e.g., Sony’s PlayStation was $299). Thus, the Apple Bandai Pippin was doomed to be one of the minor consoles of its generation and soon fell even deeper into obscurity.

Some of the games that came out for the Pippin were already available for other consoles or PCs (e.g., *Gadget: Invention, Travel & Adventure* [original release, 1993; Pippin version, 1996] and *The Journeyman Project* [original release, 1993; Pippin version, 1996]), and the only ones to feature characters that were a part of an existing franchise were Japanese games with limited popularity in North America (e.g., *Power Rangers Zeo versus the Machine Empire* [1996], *Gundam Tactics: Mobility Fleet0079* [1996], and *Dragon Ball Z: Anime Designer* [1996]).

Due to the relatively limited release of the Pippin, it is harder for collectors to find than other systems of its day. One may be able to find it on auction sites like eBay, in some cases for more than its original sales price.

Mark J. P. Wolf

See also: Generations of Technology

Further Reading

Boyle, Emma. "Apple's Biggest Flop? A Requiem for the Apple Bandai Pippin Games Console." TechRadar, March 10, 2017. Available at https://www.techradar.com/news/apples-biggest-flop-a-requiem-for-the-apple-bandai-pippin-games-console.

LEM Staff. "Apple's Pippin and Bandai's @World: Missing the Mark(et)," Low End Mac, September 22, 2006. Available at http://lowendmac.com/2006/apples-pippin-and-bandais-world-missing-the-market/.

Apps (Applications)

An app (short for software application) is any software that can be executed on a computer device, that is, a desktop computer, laptop, mobile device, smart watch, smart television, web browser, or gaming console. Such software ranges from photo-editing software to games to social media network clients.

To date, the most popular usage of the term *app* is likely in reference to any game or program specifically installed on a smartphone or tablet device through a digital app store, such as Google Play (or Play Store) or Apple's App Store. This would be inclusive of applications that serve as either stand-alone experiences (such as *Monument Valley* [2014]) or are part of a cross-platform suite (such as Google's G-Suite or Facebook). However, in the years since the inception of the smartphone, the term has become adopted more broadly, as it concerns executable software on multiple platforms.

Given that apps exist on multiple types of computational devices, user-control configurations for apps can vary significantly depending on the computer device one may be using (e.g., keyboard and mouse, game controller, remote control, phone touchscreens, watch touchscreens). The processing specifications of a computer device also play a salient role in how full featured an app might be.

For example, while Adobe offers several products that are available as both desktop and tablet apps, user experiences with these apps on tablets are often much less robust than their desktop counterparts as a function of smaller screen real estate, less storage, less intuitive/comfortable forms of user interaction, and comparatively less processing power. However, as tablets and portable devices increase in power, the distinction between desktop and tablet apps is slowly eroding.

Depending on the software, some apps may require internet connectivity to function correctly. The app may simply require the use of network services, such as e-mail clients, or it may need to support check-ins, if the app requires occasional server contact for licensing verification or otherwise.

But apps need not be restricted to software that can be installed on a computational device; there are also apps that execute remotely. Software as a service (SaaS) is a means by which users can use apps that are remotely hosted, providing services through a web browser or other client. Services such as Dropbox, Gmail, and Office 365 are among the other ways developers can provide standard app experiences for users through an exclusively online means. These services are slowly expanding to games as well.

In 2017, Nvidia began rolling out a service that allows users to cloud stream full games over the internet, known as GeForce Now. This service allows anyone, on a personal computer or laptop of nearly any processing power, to play games that would often demand much higher levels of computation if the app were installed locally. This means a computer's capacity to play such games is limited only by bandwidth as opposed to computational performance. With regard to game consoles, Sony's PlayStation Now service as well as select titles for Nintendo's Switch console also now provide the opportunity for users to stream games to their devices rather than installing them.

Whether they are games or utility software, apps may be vended via a onetime fee, through an ongoing subscription, or free with the allowance of in-app purchases that can add additional features to the app.

Nis Bojin

See also: Google Play (Portal); Steam (Portal); Zapak (Portal)

Further Reading

Hill, Simon. "The Best Android Games Currently Available (March 2020): Get Your Gaming on the Go with the Best Android Games." Digital Trends, March 6, 2020. Available at https://www.digitaltrends.com/mobile/best-android-games/.

Minor, Jordan, and Jason Cohen. "The 50 Best iPad Games: Sometimes Your iPhone Just Isn't Big Enough to Enjoy the Best of iOS Gaming. Grab Your iPad and Take Advantage of the Expanded Screen Real Estate with These Games." PCMag, December 24, 2019. Available at https://www.pcmag.com/news/the-50-best-ipad-games.

Arakawa, Minoru (1946–)

Minoru Arakawa, the second son of a millionaire family, was born in Kyoto, Japan, on September 3, 1946. He founded Nintendo of America (NOA) in 1980 and served as CEO through 2002. His father was a textile wholesaler, and the total real estate of his father's family and his mother's family combined was about one-fifth of the downtown district in Kyoto. He graduated from the Architecture Department of Kyoto University in 1969 and attended graduate school at the same university. After that, he attended graduate school at the Massachusetts Institute of Technology School of Architecture. In 1972, he joined the Marubeni Corporation and was assigned to the overseas construction and development department. On Christmas 1972, he met Yoko Yamauchi at a family party and later married her. She was the daughter of Yamauchi Hiroshi, the CEO of Nintendo at that time. In 1977, he moved to Vancouver, Canada, with his family for a condominium construction project and was very successful with the project. Upon returning to Kyoto in 1980, Yamauchi Hiroshi offered him the CEO position at NOA, and he accepted the chance to test his abilities with a big challenge. After resigning from the Marubeni Corporation, he founded NOA in New York.

In December 1980, Arakawa started his first enterprise at NOA, the importation of *Radar Scope* (1979), an early arcade game from Nintendo, although not their first. On the basis of the successful results of user testing, he ordered three thousand units from headquarters. This resulted in a big failure, however, and two thousand units went back into inventory. With an overstock of *Radar Scope* occupying the warehouse, Arakawa decided to use the game's ROM and convert it into another game, but the main development team in Kyoto did not have time to make the game. This task was finally assigned to a new employee, Miyamoto Shigeru, and the game he developed became *Donkey Kong* (1981). *Donkey Kong* was an enormous success and sold about sixty thousand units, with sales amounting to about $100 million. The following year, Arakawa moved the NOA office to Seattle.

In 1985, Arakawa introduced the Nintendo Entertainment System (NES) in the United States and sold thirty million units by 1990. In 1989, he succeeded in obtaining the rights for *Tetris* (1985) and bundled it with every Nintendo Game Boy, selling more than thirty-three million units. On January 7, 2002, Arakawa resigned from the position of CEO of NOA and founded a mobile content provider called Blue Lava Wireless and sold it to JAMDAT Mobile. In 2006, he founded the Tetris Online, Inc. with Henk Rogers and Alexey Pajitnov, the creator of *Tetris*.

Taiyoung Ryu

See also: Nintendo; Nintendo Entertainment System/Nintendo Famicom

Further Reading

Firestone, Mary. *Nintendo: The Company and Its Founders*. Edina, MN: ABDO Publishing Company, 2011.

Inoue, Osamu. *Nintendo Magic: Winning the Video Game Wars*. New York: Vertical, 2010.

Arcade Cabinet Art

Arcade cabinet art refers to the visual elements on an arcade game. On a traditional arcade cabinet, the artwork consists of the marquee on the top, a bezel that surrounds the screen, a control panel overlay (CPO), and side and front art. Marquees typically have the name of the game and occasionally art of the game characters or some other illustration. Illuminated lightbox marquees were later developed to further bring attention to the game's name and entice people to play. Bezel artwork surrounds the screen of the arcade cabinet. Sometimes the bezel art is designed to enhance the feeling of playing the game, such as being designed like a cockpit when framing a flying game. CPOs are for the control panel and typically have instructions for the various interface functions, explaining the functions of each button, joystick, or other interaction means. Side artwork refers to illustrations on the side of the arcade cabinet, and front artwork refers to illustrations on the front. As the cabinet sides contain the most free space and have no practical concerns (unlike the control panel overlay), the side art is often the most impressive aspect of arcade cabinet art, with detailed illustrations taking up the entire side of the cabinet. Arcade cabinet side art can be applied in the form of decals or silkscreen printing applications. Arcade cabinets vary wildly in specifications, size, shape, and style, but these are the art elements of a typical arcade cabinet. Some cabinets of unusual shape, like that of *Computer Space* (1971), could themselves be considered sculptural; likewise, newer cabinets are completely custom-made for their games and feature three-dimensional art elements related to the games, such as those for the *House of the Dead* series.

With cabinets often arranged alongside each other in arcades, side art is sometimes covered up by other cabinets. As a result, front art and marquee art have to entice players to come and play. Therefore, a lot of effort goes into designing marquee artwork to make it as appealing as possible in the event that the side art is covered up or the game is in a cabinet without side art. In the past, some cabinets were not specifically themed, as the cabinets were used for swapping out games (as with the DECO cassette system) or housing multiple games; as such, the marquee art was simply more general in scope.

Historically, arcade cabinet art existed not only to entice people to play the game but also to provide context to the low-resolution pixel art of early games, such as making clear that the antagonists of *Pac-Man* (1980) were ghosts instead of merely abstract pixel monsters.

Modern-day fans of arcade cabinet art have created forums and online repositories to collect and share different artworks. There is also a large community of arcade artwork fans that produce reproduction artwork for custom-built arcade cabinets. Arcade cabinet art has also been displayed in collections at art museums.

Rhys Jones

See also: Arcade Games; Arcades

Further Reading

The Arcade Flyer Archive. Accessed September 1, 2020. Available at https://flyers.arcade-museum.com/.

Guins, Raiford. "Beyond the Bezel: Coin-Op Arcade Video Game Cabinets as Design History." *Journal of Design History* 28, no. 4 (November 1, 2015): 405–426.

Nicholls, Tim, Ryan Birse, Sam Dyer, Duncan Craig, Neil Grayson, and Chris Daw. *Artcade: The Book of Classic Arcade Game Artwork*. Bath, England: Bitmap Books, 2016.

St. Clair, John. *Project Arcade: Build Your Own Arcade Machine*. Indianapolis, IN: Wiley, 2011.

Arcade Games

Arcades and arcade games existed long before video games appeared. Pinball games and other electromechanical games used motors, switches, relays, and lights to create fast-action coin-operated games for players. Some came in upright wooden cabinets with their control panels below a viewscreen, a design that arcade video games would emulate. Because of all their moving parts, electromechanical games often broke down, frustrating arcade operators and reducing profits. The industry was looking for a way to make more reliable games.

Companies such as Gottlieb, Bally, Williams, Midway, SEGA, and Allied Leisure all made electromechanical games before joining the video game industry. One such company, Nutting Associates, had an employee, Nolan Bushnell, who suggested making an arcade game from the mainframe game *Spacewar!* (1962). The result was *Computer Space* (1971), which appeared in both one- and two-player versions. The game was electronic instead of electromechanical, but its controls were more complex than other games of its day; it did not do well. Bushnell left Nutting to start Atari, and his next game was *PONG* (1972), a table tennis game similar to that of the Magnavox Odyssey. *PONG* was successful and helped launch arcade video games, which soon became the main kind of game found in arcades. For the majority of the public, arcade video games were their first exposure to video games and to computer technology itself. Arcade video games set the standards and established many of the conventions used in later games, and they led the way as a benchmark for a long time.

AN EXPANDING INDUSTRY

PONG's success encouraged other companies to produce games, and in 1973, more than two dozen arcade video games appeared, many of which were imitations of *PONG*—even Atari came out with more versions of *PONG*. Magnavox sued Atari for copying its game, and the companies settled out of court. Atari also innovated two new game forms in 1973: a maze game, *Gotcha*, and a space racing game, *Space Race*, which was licensed to Midway under the name *Asteroid*. Other games of the year included Chicago Coin's *TV Pin Game*, the first video pinball game; Nutting Associates' shooting game, *Missile Radar*; and a code-breaking game, *Watergate Caper*.

Ball-and-paddle games continued to appear through the mid-1970s, and other sports games were adapted into arcade games. In 1974 alone, there were adaptations of volleyball (*Rebound* and *Spike*), basketball (PMC's *Basketball*, Taito's *Basketball*, and Midway's *TV Basketball*), soccer (*TV Goalee*), duck hunting (Atari's *Qwak!*, which featured a light gun), and racing (Atari's *Gran Trak 10*, which featured a steering wheel and was one of the first games to use a form of read-only memory [ROM]). The use of ROM in games such as *Tank!* (1974) allowed improvements in graphics that in turn gave games more variety, moving them away from the simple blocks or lines that were used to represent everything on the screen. One ball-and-paddle game, Exidy's *TV Pinball* (1975), advertised in its flyer that the "GAME PLAYS ITSELF to attract attention when not in use"; this came to be known as an *attract mode* and was commonly used in arcade games by the 1980s.

In the mid-1970s, driving and racing games became popular, and at least a dozen of them were released, including Exidy's *Death Race* (1976), the first video game to become controversial due to its use of violence. Many of these games had steering wheel interfaces, some had foot pedals, and two-player games featured two sets of controllers. Two single-player games, Midway's *Racer* and Atari's *Hi-Way*, both had seats for the player to sit on while playing to simulate the experience of driving, and Kee Games' eight-player *Indy 800* had a steering wheel and two pedals for each player, which were arranged in a square with the screen in the middle. Some motorcycle driving games, such as Atari's *Stunt Cycle* (1976) and Digital Games Incorporated's *Heavy Traffic* (1976), had handlebars instead of steering wheels. One motorcycle game, SEGA's *Fonz* (1976), had handlebars that vibrated during collisions, an early example of haptic feedback in a video game. Most of the other arcade games of the mid-1970s were sports-related, including billiards, skiing, pinball, baseball, football, bowling, boxing, and shooting games, some of which had either mounted or tethered guns that players used as part of the interface.

Besides new interfaces, other technological advances appeared in the mid to late 1970s. Ramtek's *Trivia* (1976) stored two thousand questions on an eight-track audiotape, allowing operators to change the tape and load new questions, an idea that would later be revisited by the DECO cassette system in the 1980s. Kee Games' *Super Bug* (1977), a driving game, had a Volkswagen Beetle ("Bug") that stayed on-screen while the background moved behind it, in all four directions (up, down, left, right), making it very likely the first video game to feature scrolling. Another advance that appeared in 1977 was the new type of graphics used by vector games, which produced its imagery using line segments rather than raster graphics; for example, Cinematronics' *Starhawk* (1978), Atari's *Asteroids* (1979), and Vectorbeam's *Warrior* (1979). More games were using color graphics, and Namco's *Galaxian* (1979) was the first game to have all of its graphics in true RGB color.

The 1970s ended with two hit games that ushered in the golden age of arcade video games. *Space Invaders* (1978) was made by Taito and licensed to Bally/Midway for release in the United States; it was so popular in Japan that it caused a shortage of one hundred yen coins. Another game that originated in Japan, *Puck-Man* (1979), was renamed and released as *Pac-Man* (1980) and became one of the biggest moneymakers in the arcade; *Pac-Man* and another hit game, *Defender* (1980), would each go on to take in more than a billion dollars in revenue. The same year saw the release of Atari's *Battlezone* (1980), the first arcade game in which the environment was produced with true three-dimensional computation, and Cinematronics' *Rip Off* (1980), a game with cooperative gameplay in which players had to work together rather than against each other.

By the start of the 1980s, the video game had replaced pinball as the dominant game of the arcade, and in 1981, *Play Meter* magazine estimated that there were twenty-four thousand full arcades, four hundred thousand street locations, and 1.5 million arcade video games in operation. Arcade video games also innovated several forms of cabinet design. Although most came in the upright stand-alone cabinet pioneered by earlier arcade games, some sports games came in the "cocktail-style" cabinet, which set the screen facing upward in a small table that players sat around and on which players could place their drinks. Driving and racing games sometimes came in "ride-on" consoles that the player sat on while playing, and Exidy's *Star Fire* (1979) was the first game to have an enclosed cockpit (although an upright version was also released), and it was also the first game to feature a high score table with players' initials.

The boom continued into the next two years, which saw the release of *Tempest* (1981), *Qix* (1981), *Frogger* (1981), *Centipede* (1981; the first arcade video game designed by a woman), *Robotron 2084* (1982), *Dig Dug* (1982), *Pole Position* (1982), *Zaxxon* (1982), and Nintendo's first successful arcade game, *Donkey Kong* (1981). But starting in 1982, many games were released that were sequels, such as *Baby Pac-Man*, *Pac-Man Plus*, *Super Pac-Man*, *Donkey Kong Jr.*, *Missile Command 2*, *Frenzy* (a sequel to *Berzerk*), and *Millipede* (a sequel to *Centipede*), suggesting that the industry was relying more and more on past successes and beginning to stagnate. By the end of 1982, arcade profits were dropping, distributors of arcade games were overstocked, and the great video game industry crash of 1983 soon brought an end to arcade video games' golden age.

STRUGGLING TO COMPETE

Although the number of arcades had peaked at about ten thousand in 1982 (Wolf 2007, 105), more than two thousand of them would close in 1983 as the crash worsened. One attempt to rejuvenate the industry involved laserdisc games, such as *Dragon's Lair* (1983), which brought full-motion video (FMV) into arcade games, but with reduced interaction as a result. Laserdisc games were far more expensive to produce than other games, and in the end, they failed to live up to the hype and expectations. Another technical advance introduced to the arcade was filled-polygon three-dimensional graphics, in which objects were solid and colored, unlike the wireframe graphics of vector games, where objects were defined as a series of outlines. Atari's *I, Robot* (1983) was the first arcade game to feature such graphics, but the level of computing power available resulted in a rather simplified and abstract setting in which a robot moved around a blocky three-dimensional structure, changing the color of the surface it passed over. The game failed commercially, and filled-polygon graphics would not return until the late 1980s, when more computing power was available.

Unlike the period of 1978–82, which saw the release of many games now considered classics, the rest of the 1980s saw far fewer arcade games of note. Nintendo's *Mario Bros.* (1983) and *Super Mario Bros.* (1985) started its *Mario* series of games, and Atari's *Crystal Castles* (1983), *Star Wars* (1983), and *Tetris* (1988) were popular as well as Gottlieb's *Q*bert* (1983). Also, Atari Games' *Gauntlet* (1985) had an interactive environment that multiple players could experience simultaneously. But many games were sequels hoping to cash in on their predecessors' successes, including *Discs of Tron* (1983), *Donkey Kong 3* (1983), *Pole Position II* (1983), *Galaga 3* (1984), *Dig Dug II* (1985), *Pitfall II: The Lost Caverns* (1985), *Return of the Invaders* (1985), and more *Pac-Man* sequels, including *Jr. Pac-Man* (1983), *Pac & Pal* (1983), *Pac-Man & Chomp Chomp* (1983), *Professor Pac-Man* (1983), and *Pac-Land* (1984).

As players tired of games, income fell, and replacing arcade games was expensive and cumbersome. Systems came into use that allowed arcade operators to change games, much as home game cartridges allowed many different games to be played by the same system. Data East's DECO Cassette System, introduced in 1981, used magnetic tape cassettes with game programs on them, although, in the end, the tapes were not as reliable or durable as operators had hoped. Nintendo's Vs. System (also known as the UniSystem [single-player games] or DualSystem [for two-player head-to-head games]) was a version of the Nintendo Entertainment System (NES) with some additional arcade game hardware; home games were starting to catch up to arcade games as new generations of technology emerged. Other companies also developed their own arcade game systems, including Atari Games' Atari System 1 in 1986, Capcom's CP System 1 in 1988, SNK's Neo•Geo MVS in 1989, and SEGA's Mega Tech System in 1989. These interchangeable systems also changed the look of arcade games. Because a variety of different games would use the same cabinet, the cabinets were often bland and lacked the colorful artwork that appeared on dedicated cabinets.

An industry-wide standard for interchangeable hardware also came into use. With Nintendo's rise, Japan became a center of video game production, and in 1982, the Japanese Arcade Machine Manufacturers' Association (JAMMA) was organized. Around 1985, JAMMA introduced a wiring standard for arcade machines, known as the JAMMA conversion class, which became the standard used by Japanese as well as many American game companies. All games using the JAMMA standard could be converted from one to the other by changing the printed circuit boards inside. As the interchangeability of the games made piracy more of a threat, some companies, including SEGA and Capcom, used what are now called *suicide batteries*, which supplied power to a small amount of RAM that held a decryption key needed to decode the program code in the game's ROM. When a battery died, the RAM was erased, and without the decryption key, the game could no longer run.

By the early 1990s, it was clear that the industry would probably not return to the heights of its glory days before the crash. Like the 1980s, the 1990s saw a large number of sequels, variants, and series games produced. Certain genres flourished, including vertically oriented shooting games, fighting games (e.g., the *Street Fighter* series, the *Mortal Kombat* series, and the *Tekken* series), puzzle games (many of which were *Tetris* clones), and mahjong games, which were popular in Japan. Home video games were starting to provide vigorous competition, and to stay ahead of them, arcade games would have to provide things that home games could not, such as cockpit games that the player sat in or hydraulic systems that moved and shook players as they played, like those of *After Burner* (1987) and *After Burner II* (1987). The number of three- and four-player games increased dramatically, and some six-player games were produced, such as SEGA's *Hard Dunk* (1994), Atari Games' *T-Mek* (1994), Konami's *X-MEN* (1992), and Namco's *Galaxian 3* (1990) and *Attack of the Zolgear* (1994). Racing games such as Namco's *Final Lap 2* (1991) and SEGA's *Daytona USA* (1994) and *Manx TT Superbike Twin* (1995) could accommodate up to eight players when the cabinets were networked together. *Daytona USA 2: Power Edition* (1999) could network up to forty players.

Specialized interfaces also continued to add to the gameplay experience, such as the sit-in car seats, steering wheels, and motorcycle handlebars in driving and racing games. Namco's *Driver's Eyes* (1990) had a panoramic image spread over three video monitors that extended into the player's peripheral vision, and *Lucky & Wild* (1993), a two-player cooperative game, combined interfaces and had a steering wheel, foot pedal, and two mounted guns. Games simulated a variety of vehicles, including planes (*Landing Gear* [1995] and *Airline Pilots* [1999]), an excavator (*Power Shovel Simulator* [1999]), a motorboat (*Powerboat Racing* [1998]), a train (*Densha De Go! 2* [1999]), a pedaling bicycle (*Prop Cycle* [1996]), a hang glider (*Hang Pilot* [1997]), water scooters (*Aqua Jet* [1996] and *Wave Runner* [1996]), and even a horse (*Final Furlong* [1997]). Players stood on a moving interface in games that simulated skateboarding (*Top Skater* [1997]), snowboarding (*Alpine Surfer* [1996]), and skiing (*Alpine Racer* [1995], *Alpine Racer 2* [1997], and *Ski Champ* [1998]). Sports games sometimes included game balls in their interfaces for sports such as soccer (*Football Power* [1999] and *Kick It!* [1997]), bowling (*Family Bowl* [1998]), and billiards (*Super Strike* [1990] and *Slick Shot* [1990]). Other sports had specialized interface devices, such as boxing gloves (*Sonic Blast Man* [1990]), a robotic arm (*Arm Champ* [1988] and *Arm Champ II* [1992]), or a fishing rod (*Angler King* [1990], *Sport Fishing* [1994], *Sport Fishing 2* [1995], *Get Bass* [1998], and *SEGA Marine Fishing* [1999]).

New interface devices could even start new genres, such as rhythm and dance games in which players coordinate their movements to music; Konami produced so many that they had a separate division, Bemani Games, to produce them (see Bemani). These interface devices for these games included miniature drum sets (*Drumscape* [1990] and the *DrumMania* series), pianos and DJ turntables (the *Beatmania* series), guitars (*Guitar Jam* [1999] and the *GuitarFreaks* series), and a pressure-sensitive dance floor (Konami's *Dance Dance Revolution* [1998], sixteen versions of which appeared from 1998 to 2006). Two virtual reality (VR) games with head-mounted displays appeared: *Dactyl Nightmare* (1992) and *Virtual Combat* (1993). But while the 1990s saw some innovative hardware, it was changes in software, particularly game graphics, where home console-based games were catching up and raising players' expectations, which would have to be met if arcades were to continue.

True three-dimensional graphics began appearing with more regularity in the early 1990s, when sufficient computing power finally became available, and they were typically used in racing games (e.g., *Driver's Edge* [1994] and *Ridge Racer 2* [1994]) and fighting games (e.g., *Virtua Striker* [1994], *Soul Edge* [1995], and the *Tekken* series). But competition with home game systems continued, and the mid-1990s release of the Sony PlayStation, the SEGA Saturn, and the Nintendo 64 helped to narrow the gap even further. As more powerful home consoles appeared, arcade games would decline even more in popularity.

THE DECLINE OF THE ARCADE

Just as video games displaced pinball games in the 1970s and early 1980s, video games were starting to become displaced by redemption games during the 1990s, as operators began to believe that they would be more profitable. Redemption games involved some sort of skill (like Skee-Ball) and paid out in tokens or tickets that players could redeem for prizes (hence the name "redemption"). Redemption games typically had shorter play times than video games and were more family-friendly because they did not have the reputation for being violent that many video games had. Just as there were a few hybrid pinball/video games, there were hybrids combining video games and redemption games, including *Golly! Ghost!* (1991), *Bonk's Adventure* (1994), *Frantic Fred* (1998), and *Mallet Madness* (1999). Like the interfaces discussed earlier, these games, with their payouts, provided an experience that home games could not.

As the old style of arcade declined, arcades changed into game centers, video game lounges, and *location-based entertainment centers* that also offered dining and socializing. During the 1990s, Namco opened a chain of Cyberstation Amusement Zones and produced game theaters that were small rooms in which a team of six people sat playing a game with large images projected on the walls by over a dozen projectors. In 1997, several well-known media companies opened chains of location-based entertainment centers, including Disney, Sony, Viacom, and SEGA, whose Game-Works was a joint venture with Dream-Works and Universal Studios. In Japan as well, the 1990s saw arcades being transformed into family-oriented *amyuuzumento sentaa* (amusement centers) that tried to avoid the seedy image that arcades sometimes had.

Although few arcades remained in the early twenty-first century, the games themselves enjoyed a comeback as collectibles and nostalgia. Collectors bought old games, and in 1990, they started the Video Arcade Preservation Society (VAPS). A number of resources, such as the Killer List of Videogames (KLOV), offered game information. Several museums have featured arcade games in exhibitions, making them available to players, and emulators such as MAME (which originally stood for Multiple Arcade Machine Emulator) try to digitally recreate the games on personal computers. Arcade games continue to influence the video game industry that they began and introduced to the public, paving the way for all the other branches of the industry to come.

Mark J. P. Wolf

See also: Arcade Cabinet Art; Arcades; Laserdisc Games; MAME; Vector Games

Further Reading

DeMaria, Rusel, and Johnny L. Wilson. *High Score!: The Illustrated History of Electronic Games*. Berkeley, CA: McGraw Hill/Osborne, 2002.

Kent, Steven. *The Ultimate History of Video Games: The Story behind the Craze That Touched Our Lives and Changed the World*. Roseville, CA: Prima Publishing, 2001.

Killer List of Video Games. Accessed September 1, 2020. Available at http://www.klov.com.

Wolf, Mark J. P., ed. *The Video Game Explosion: A History from PONG to PlayStation and Beyond*. Westport, CT: Greenwood Press, 2007.

Wolf, Mark J. P. *Video Games FAQ*. Montclair, NJ: Hal Leonard Performing Arts Publishing Group, 2017.

Arcades

Arcades are commercial venues that feature coin-operated amusements such as video games, pinball machines, and other electromechanical games as well as merchandiser and redemption machines. Electronic arcade games are usually housed in colorful cabinets with coin or paper currency slots, a screen, and controllers. Contemporary arcades consist of rows or clusters of these cabinets. Video game arcades emerged in the 1970s, but the existence of arcades dates to the late nineteenth century.

Amusement arcades are not synonymous with the shopping arcades that also emerged during the nineteenth century, but their histories overlap in significant ways. The shopping arcades that were built in Europe and the United States during the early decades of the nineteenth century were, in form and content, the product of industrialization. The arcades, enclosed passageways between buildings, used new glass and iron construction and were lined with plate glass store windows that artfully displayed the latest mass-produced consumer goods (Geist 1985). Arcades merged mechanical spectacles with the spectacle of consumption (Benjamin 1999). The store windows in the arcades often featured automatons and other novelties to cash in on the rage for all things mechanical and “automatic” (Pearson 1992). Similarly, merchants used new musical recording and early cinematic devices, such as the phonograph, mutoscope, and kinetoscope, to attract customers.

GUNBLADE NY
SEGA
XLAH-1
The Big Apple needs your help. Go for it!
SPECIAL AIR ASSAULT FORCE
GUNBLADE

Sergeant George Camblair plays a pinball machine at the post exchange in Fort Belvoir, Virginia in September of 1942, the same year that Mayor Fiorello Henry LaGuardia banned pinball in New York City. (Library of Congress)

Sega's *Gunblade NY: Special Air Assault Force* (1995) (on the left), along with other arcade machines of the 1990s. (Jjspring/Dreamstime.com)

At the beginning of the twentieth century, stand-alone businesses featuring coin-operated phonographs, film-showing devices like the mutoscope, coin-operated bagatelle machines, and early pinball games became successful in and out of the shopping arcades. By 1905, companies such as the Automatic Vaudeville Company operated dozens of such penny arcades in the major cities of the Northeastern United States. These arcades, however, went into decline when film exhibition moved away from single-viewer coin-operated devices to projection on a screen in front of an audience in a theater (Musser 1994).

The history of arcades is characterized by several boom and bust cycles. In the 1930s, during the Great Depression, arcades reemerged as venues for low-cost entertainment featuring electric coin-operated pinball machines. The game *Ballyhoo* (1932), invented by Raymond Maloney, kicked off the craze. Maloney went on to create the Bally Manufacturing Company in Chicago, which became a major arcade video game manufacturer. The success of pinball parlors declined in the postwar era after pinball machines were outlawed as gambling devices in some major cities in the United States and Canada. Most famously, New York City mayor Fiorello Henry LaGuardia banned pinball in the city in 1942; the ban lasted until 1976.

Arcades saw a revival again in the 1970s with the emergence of video games. During the 1970s and 1980s, arcades were integral to the establishment of the video game industry. The first mass-produced commercial arcade video game, *Computer Space* (1971), developed by Nolan Bushnell for Nutting Associates, was a coin-operated version of the mainframe game *Spacewar!* (1962). Shortly after its release, Bushnell founded the company Atari and released *PONG* (1972), an arcade version of an electronic tennis game. With their coin slots and placements in taverns and pinball parlors, early arcade video games adopted the interface and business model of older coin-operated amusements. Companies such as Midway Games and Bally licensed and distributed video games to expand their existing slot machine and pinball businesses. Some game manufacturers provided the financial backing for arcades. For example, Bushnell started the chain Chuck E. Cheese's Pizza Time Theatre in 1977 to combine arcade games with a sit-down dinner and animatronic show. Chains such as Time Out, Aladdin's Castle, Cyberstation, SpacePort, Diamond Jim's, and Pocket Change operated thousands of arcades. Many of these chains were, or are, currently owned by the Japanese gaming company Namco Ltd.

Just like their nineteenth-century predecessors, video game arcades tied mechanized leisure to conspicuous consumption (Huhtamo 2005). In North America, the venues were often located in suburban shopping malls, a type of development that was expanding during the same period. Although home gaming systems entered the market in 1972, arcades remained the places where most people could afford to experience the new medium well into the 1980s. That being the case, the spatial, economic, and social dynamics of arcades established some key features of video games and gaming culture. Classic arcade video games such as *Space Invaders* (1978), *Asteroids* (1979), and *Pac-Man* (1980) emphasized action, discrete levels, and increasing difficulty. These features were responses to the design necessities of coin-operated amusements: primarily that they must reward skill to encourage repeat visits but be difficult enough to require most players to spend more than a single quarter.

Before the emergence of online gaming and esports, arcades served as sites for multiplayer gaming, and some hosted competitive video game tournaments. Arcades catered to throngs of teenagers, especially boys, who gathered in them to try out the newest games and who used arcades as social spaces away from parents and teachers (Kocurek 2015). Arcades also introduced a generation to computers and computational media before personal computers were ubiquitous.

In North America, the popularity of video game arcades declined in the late 1980s and 1990s, mostly as a result of competition from home gaming systems and personal computers. Their decline can also be partly attributed to the sense of moral impropriety that became attached to them. Like carnival midways and penny arcades at the beginning of the twentieth century and pinball parlors in the 1930s, video game arcades were the subject of debates about the moral character of their proprietors and patrons and about the appropriateness of such amusements for segments of the population that were deemed “impressionable” (historically, children, women, the working class, minorities, and immigrants). In the 1970s, the low lighting favored by many arcades contributed to similar concerns that they were not safe places for adolescents. Fearing the violence of video games, some suggested that arcades might have negative effects on teens and attract criminals. Others worried that the popularity of arcades and their proximity to schools would lead to truancy. Arcade owners changed the lighting and hired security guards to assuage these fears and to keep their adolescent patrons, but the stigma never fully receded. A glut of poorly designed games, games’ fading status as a novelty, and competition from newly affordable personal computers contributed to the industry-wide crash of 1983. More than two thousand arcades closed that year alone. By the mid-1980s, the emergence of more sophisticated home gaming systems, such as the Nintendo Entertainment System (NES), revived the home video game market, but arcades continued to languish throughout the 1980s and 1990s.

The history of video game arcades has been slightly different in Asia, where the popularity of arcades remained fairly consistent throughout the 1970s, 1980s, and 1990s, despite shifts in the global gaming industry away from arcade games and toward home gaming systems. Since 2000, however, arcades in Asia have been losing business to online game centers, which offer players computers and internet access for popular massively multiplayer online role-playing games (MMORPGs).

Currently, video game arcades in North America are not usually stand-alone businesses but rather a side attraction in a larger entertainment complex. Arcades are most often found in the lobbies of large movie theaters, in shopping malls and casinos, and as part of “family entertainment centers” alongside go-kart racing and miniature golf. However, arcades continue to maintain relevance in global video game culture by offering access to elaborate and emerging interfaces for gameplay. Game cabinets designed like cockpits for flight simulation games, multiple screens, and controllers shaped like motorcycles that players ride in racing games, for example, provide immersive gaming experiences that are unique to arcades. Stand-alone arcades have made a modest resurgence in recent years, partly catering to adult nostalgia for pre-internet entertainment and socializing and partly to provide affordable access to new virtual reality (VR) gaming content and platforms, such as the Oculus Rift and HTC Vive.

Aubrey Anable

See also: Arcade Cabinet Art; Arcade Games

Further Reading

Benjamin, Walter. *The Arcades Project*. Translated by Howard Eiland and Kevin McLaughlin. Cambridge, MA: Belknap Press of Harvard University Press, 1999.

Geist, Johann F. *Arcades: The History of a Building Type*. Cambridge, MA: MIT Press, 1985.

Huhtamo, Erkki. "Slots of Fun, Slots of Trouble: An Archaeology of Arcade Gaming." In *Handbook of Computer Games Studies*, edited by Joost Raessens and Jeffrey Goldstein, 3–21. Cambridge, MA: MIT Press, 2005.

Kocurek, Carly A. *Coin-Operated Americans: Rebooting Boyhood at the Video Game Arcade*. Minneapolis: University of Minnesota Press, 2015.

Museum of the Game website. Accessed September 1, 2020. Available at http://www.arcade-museum.com.

Musser, Charles. *The Emergence of Cinema: The American Screen to 1907*. Vol. 1 of *History of the American Cinema*, edited by Charles Harpole. Berkeley: University of California Press, 1994.

Pearson, Lynn F. *Amusement Machines*. Princes Riseborough, Buckinghamshire, England: Shire Publications, 1992.

Archives

Video game archives are collections of games and related materials that are intended for posterity. They range in size from large public memory institutions (e.g., The Strong: National Museum of Play) to small private collections (e.g., FEMICOM Museum) and may be broadly differentiated into four categories: personal, academic, public, and commercial.

Personal archives are assembled by individuals and largely meant for personal use. As such, they are the most idiosyncratic archive type, depending entirely upon the collector's personal motivations to drive the archival act. This leads to great variety among personal archives, as what captivates one collector may bore another.

Academic archives are designed to assist researchers in the production and dissemination of knowledge about games and their cultures. As a result, academic archives are often located within institutions of higher education or dedicated research centers and therefore tend to be leading sites for the science of materials preservation as well as for comprehensive historical, industrial, and aesthetic studies.

Public archives' principal purpose is community access and edification, that is, the general improvement and entertainment of the populace. Public archives include museums, libraries, and other public-facing institutions and are generally the most well-known type of archive.

Commercial archives are located within companies and function as resources for product development and intellectual property protection. In contrast to public and academic archives, commercial archives tend to be closed to everyone except company employees.

Regardless of type, video game archives function along three primary axes at the materials level: collection, organization, and preservation; infrequently, exhibition may constitute a fourth axis. *Collection* is the act of acquiring and aggregating game materials. These materials may include game hardware, software, and paratexts (i.e., materials related to hardware and software, such as ancillary products, promotional materials, and development resources). *Organization* involves the tracking and storing of these materials, with the goal of creating an accurate, up-to-date, and accessible map of the archive's contents. *Preservation* is the process by which archival materials are safeguarded against the ravages of use and time. Preservation may take the form of climate-controlled containers for physical materials such as cartridges, a data migration plan for digital items, or conservation work to repair and maintain game machinery. *Exhibition* involves the design and mounting of selected artifacts from the archive for display along with the production of relevant interpretive materials used to educate visitors. Collection, organization, preservation, and exhibition practices vary by individual archive as well as by archive type and are highly dependent on local financial and human resources.

Importantly, game archives also function in ways beyond any material contents. For instance, taken as a whole, archives tell stories not only through exhibitions they may host but also through their acquisition methods and rationales. Archives are what they ingest, and an examination of their contents speaks volumes about the values, priorities, and ideologies of their curators. Moreover, game archives are built environments that serve a bridging function, link the like-minded people who use an archive's materials, act as a shared repository and sanctuary for objects held precious by collector donors, and function as tutors in edifying and amazing visitors. Finally, archivists—the stewards of archives—are miradors overlooking their archive's full scope. As such, the archivist is a bellwether for gaps and trends, not only as they appear in a particular collection but also of the cultural and artifactual context from which every archive selectively grows.

Given the many functions that game archives serve, it is not surprising that both the technical and organizational aspects governing them are complex. For example, many games have very specific hardware and software dependencies, meaning that the environment necessary to load and run them is equally specific. To archive such a game, then, requires archiving a copy of its entire hardware and software environment; without such, the game will be unplayable. Likewise, an archive that is overcrowded or poorly organized not only undermines the capacity of the facility to assist users but also diminishes the potential of the archive generally to meet its posterity-serving mission.

Such impactful technical and organizational interdependencies necessitate sophisticated and multifaceted approaches to collecting, organizing, preserving, and exhibiting games. They are also why technologies such as emulation—the software-based mimicking of a game's hardware and software environment to make it accessible to a larger audience—is increasingly common in game archives around the world. Because emulation eliminates many technical preservation challenges, it reduces the physical space and organizational resource footprint of an archive. Emulation also provides access to game experiences beyond the limits and life span of the original hardware and software environment. The same is true for audiovisual captures of gameplay, which some archives also specialize in. Such captures offer yet another way to recall and understand game sights, sounds, and stories as well as the developers and players who cocreate them.

Ultimately, archives are essential to gaming's past and future. They serve as access points from which to write history and funds upon which to draw design influence for tomorrow's games.

Judd Ethan Ruggill and Ken S. McAllister

See also: Preservation

Further Reading

Guins, Raiford. *Game After: A Cultural Study of Video Game Afterlife*. Cambridge, MA: MIT Press, 2014.

Newman, James. *Best Before: Videogames, Supersession, and Obsolescence*. New York: Routledge, 2012.

Oliver, Gillian, and Ross Harvey. *Digital Curation*. 2nd ed. Chicago: ALA Neal-Schuman, 2016.

Ruggill, Judd Ethan, and Ken S. McAllister. "Computer Game Archiving and the Serious Work of Silliness." *Animation Journal* 19 (2011): 67–77.

Argentina

In the last thirty years, the consumption of video games in Argentina has increased due to accessibility (through social networks) and the massive use of mobile devices. Argentina's advantage in the video game industry is high-quality production with low-cost budgets. The national industry exports 95 percent of the total product developed, and in 2017, it raised more than five hundred million pesos.

INSTITUTIONS OF THE SECTOR

Since 2004, the Asociación Argentina de Videojuegos (ADVA; https://www.adva.vg/) works with video game studios and developers to promote the growth of digital and interactive entertainment produced in Argentina. ADVA is an intermediate institution that articulates actions between studies and entrepreneurs dedicated to video game development and the public sector, the private sector, and the academy, promoting and boosting the local video game production. ADVA's multiple activities include the Argentine Exhibition of Videogames (EXPO EVA) (www.expoeva.com), which was organized in 2003 and has continued since then. EXPO EVA is a place for meeting others, training, and business development. EVA PLAY, held within the framework of EXPO EVA, annually exhibits the most recent productions made by Latin American developers for all platforms.

The Fundación Argentina de Videojuegos (FUNDAV 2016; http://fundav.com/) was created to "promote the economic, social and cultural development of videogames, contributing the value of artistic products and developments throughout Argentina. This organization organizes events, courses, game jams and multiple activities to promote the growth of local industry." Among its multiple activities are COREAR, a video game orchestra that brings together independent musicians and makes presentations at events and cultural centers; Game Work Jam, a free community event that has a working jam format with mentoring over several months; and HUB, an event initiated in 2018, with free access, that focused on the promotion of playful practices in different professional fields (such as health and education, among others), with general activities linked to technology and video game–themed shows.

FROM GAMERS TO DEVELOPERS AND GAME DESIGNERS (1980–2019)

The first video game produced in Argentina was the popular *Juego de Truco* (1982), which was based on a very popular card game in Argentina. Naomi Marcela Nievas, who used the pseudonym "Sharara," designed *Scrunff* (1985), which was also among the first Argentine games. Her works include digital disk machines, electronic bingo, and digital slot machines. Nievas was one of the first women to join the industry.

Since 1988, more than a few video game studios have established offices in Argentina, and some companies work exclusively in the video game industry and are strong exporters. There are at least seventy companies that develop video games in Argentina, in addition to the community of independent developers (Comunidad INDIE). Argentine developers are recognized throughout the world, and their employees offer creative and innovative ideas to complementary industries, such as film, television, and advertising.

During the twenty-first century, a number of games brought recognition to the Argentine industry. Art game pioneer Daniel Bermergui, a developer of independent games, was recognized for his game *Storyteller* (2011) with the Nuovo prize at the Game Developer Conference in 2012, and other notable art games include *Lumière and Nycteris* (2010) by Martin Gonzalez, *Rabbit Fable* (2013) by Santiago Franzani, and *Panoramic* (2012) by Agustín Pérez Fernández (Tembac). *Master of Orion: Conquer the Stars* (2016), a reboot of the well-known 1993 strategy video game set in space, was released by NGD Studios and became one of the most important triple-A projects in Argentina. *DOGOS* (2016), a shooting game by OPQAM, was developed without the help of external engines and was released for PC, PlayStation 4, and Xbox One. *Element: Space* (2019) is an original intellectual property developed by Sixth Vowel Studio and published for PC by Inca Games, a national publisher established in 2018. *Element: Space* is a triple-A turn-based tactical squad role-playing game with a story that varies according to choices made by the player. The game won an award at Indie

Megabooth 2018 at ExpoPax West (http://indiemegabooth.com/project/element-space/). *Ethereal* (2019), produced by Nonsense Arts, is an ingenious puzzle game with a simplistic and harmonious style; it became a finalist in the 2019 Independent Game Festival, where it won Excellence in Audio, in addition of receiving several awards at Brazil's Independent Games Festival and Game Connection America, among others.

GAME STUDIES IN EDUCATION

One of the oldest research groups is ALFAS-Argentina (https://www.grupoalfas.com/), directed by Dra G. Esnaola Horacek, which gathers researchers from three national universities; CI2S Labs (directed by Dr. D. López De Luise, which has projects in the IECyT), UADER, and SCA. The group is also led by Durgan A. Nallar, at Maimónides University.

Academic research exhibits at international congresses give an account of the interest that game studies in education arouses (Congreso Internacional de Videojuegos y Educación [CIVE]). There are numerous research groups interested in the sector, including the Institute of Digital Entrepreneurship of the Scientific Society Argentina (SCA) led by Dr. López De Luise of CI2S Labs, which is interested in the teaching perspectives of STEAM (science, technology, engineering, arts, and mathematics) courses.

Another project developed at Maimónides University (in the Digital Design and Cultures Center of the School of Communication and Multimedia Design) and led by Durgan Nallar (from the Center of Innovation in Technology and Pedagogy of the University of Buenos Aires) proposes the fusion of game design and transmedia narrative as a technique for teaching.

Finally, we can consider that the local video game industry still produces high-quality productions despite relatively low budgets and its position in a depressed financial context, showing the resilience of the industry.

Graciela Alicia Esnaola, Alejandro Iparraguire, Guillaume Averbuj, Maria Luján Oulton, and Francisco E. Cattaneo Esnaola

See also: Brazil; Chile; Colombia; Uruguay

Further Reading

De Luise, Daniela López, and Fabian Silva. "Metrics Design for Keyboard and Mouse: Assessing Learning Levels." *2017 IEEE URUCON* (2017): 1–4. Available at http://ieeexplore.ieee.org/document/8171846.

"La docilizacion del pensamiento a través del macrodiscurso cultural y la convergencia tecnológica." Vol. 10. Universidad de Salamanca. Accessed September 1, 2020. Available at http://www.usal.es/~teoriaeducacion/.

Esnaola, G. *Claves culturales en la construcción del conocimiento. ¿Qué enseñan los videojuegos?* Buenos Aires: Alfagrama, 2006.

Esnaola, G. "Videojuegos 'Teaching Tech": Pedagogos de la convergencia global." 2009. Available at https://revistas.usal.es/index.php/eks/article/view/15725.

Esnaola, G., A. Iparraguirre, G. Averbuj, and M. Oulton. “Argentina.” In *Video Games around the World*, edited by Mark J. P. Wolf, 35–55. Cambridge, MA: MIT Press, 2015.

Esnaola G., and D. Levis. “La narrativa de los videojuegos: un espacio cultural de aprendizaje emocional.” *Monográfico Videojuegos: Una herramienta en el proceso educativo del “Homo Digitalis”* 9, no. 3 (2008). Revista Teoría de la Educación. Educación y Cultura en la Sociedad de la Información. (Universidad de Salamanca). Available at http://www.usal.es/∼teoriaeducacion/.

Esnaola Horacek, G., and F. Revuelta Domínguez. *Videojuegos en Redes Sociales. Nuevas Perspectivas en Edutainment*. Barcelona, Spain: Laertes, 2013.

Fundación Argentina de Videojuegos (FUNDAV) webpage 2016. Available at http://fundav.com/.

Lopez, De Luise, and F. Silva. “Parametrization of Video Games User Behavior.” *CICC-2018 Proceedings*, Springer LNNS Series, International Conference on Innovative Computing and Communication (ICICC-2018), held at Guru Nanak Institute of Management Delhi, May 5–6, 2018.

Art

The association between art and video games goes back almost to the beginning of the history of video games. Even though the industry arose from the conjuncture of military-industrial research and a blossoming hacker culture, programmers and early designers with aesthetic sensibilities took part in the early evolution of the medium, which shifted from a simple curiosity or computing experimentation to a specific design practice aimed to create singular interactive experiences. As demonstrated by the title of his book *The Art of Computer Game Design* (1982)—the first book of its kind—Chris Crawford was one of the earliest game designers to claim artistic means for video games and to insist that computer game design is an art form. From then on, debates about whether video games are art have been consistently reappearing in journalistic, practitioner, and scholarly discourses.

Notwithstanding this debate, many instances of art can be found in video game content and forms. Paintings have influenced many game designers to create styles and aesthetic experiences different from the commonly known photo-realistic simulations or caricatured and stereotyped stories that we find in most video games. For example, game designer Tetsuya Mizuguchi claimed that he was influenced by the Russian painter Wassily Kandinsky for the creation of the unusual abstract style in the game *Rez* (2001), a kind of hallucinogenic and kinetic shooting game surrounded by techno music that evolves according to the input of the player. The same can be said for the games *Echochrome* (2008), *Monument Valley* (2014), and *Monument Valley 2* (2017), all of which were designed in accordance with the optical illusions of M. C. Escher’s graphic art.

Other visual art styles have also influenced some designers to create beautiful and singular aesthetic experiences. Capcom’s *Okami* (2006) is a masterful action-adventure game strongly influenced by the art of Japanese calligraphy but also by *ukiyo-e*, a woodblock prints style of painting mostly popular during the Edo period (1608–1868). Other video games were influenced by Japanese traditional and modern visual art, such as games from the Japanese company Vanillaware (*Odin Sphere* [2007], *GrimGrimoire* [2007], *Muramasa: The Demon Blade* [2009], and *Dragon's Crown* [2013]), which specializes in sprite-based game design.

Even the artists themselves have designed distinctive video games, such as the experimental artist Toshio Iwai, who created the Nintendo DS game *Electroplankton* (2005), a kind of music generator in which the graphics (mostly wave motions) help to generate new age music as the player touches the screen with a stylus. This interactive musical happening is arguably more a work of art than a video game. Such software is better categorized in the genre of *art games*, which are mostly works of art made by artists from a game engine or those intended to be experienced as an artistic (and ludic) interactive encounter.

A strong community of artists has devoted their artistic practice to the creation of such artwork, including JODI, Cory Arcangel, Brody Condon, Anne-Marie Schleiner, Julian Oliver, and Eddo Stern. Many websites specialize in exhibiting and analyzing this art, such as artificial.dk, rhizome.org, or gamescenes.org. Reversing the relationship, video games can be used as the theme or the subject of art, an activity named *game art* (which is art inspired by game culture), and many game art exhibitions have taken place in museums and art galleries since the early 2000s. Video games have also entered the museum realm as contemporary works of art with efforts such as the Museum of Modern Art in New York City (MOMA) adding fourteen video games to their permanent collection in 2012 (with other subsequent "waves" of addition) and the Strong National Museum of Play's "World Video Game Hall of Fame." Thus, art and games have had a long-lasting relationship since the end of the twentieth century—one that continues to grow and flourish.

Martin Picard

See also: Art, Video Games as

Further Reading

Bittanti, Matteo, and Domenico Quaranta, eds. *Gamescenes: Art in the Age of Videogames*. Milan, Italy: Johan & Levi Editore, 2006.

Clarke, Andy, ed. *Videogames and Art*. Bristol, England: Intellect, 2007.

Crawford, Chris. *The Art of Computer Game Design*. Berkeley, CA: Osborne/McGraw-Hill, 1982.

Tavinor, Grant. *The Art of Videogames*. Malden, MA: Wiley-Blackwell, 2009.

Art, Video Games as

That the question is still asked as to whether video games can be art demonstrates the comparative youth of video games to other media, such as film, television, photography, and so on, which were themselves the subject of debates as to their status as art when they were in their youth. Although the video game continues to develop and mature, its potential has already been made manifest enough for its status as an art form to be secured alongside older media that have proven themselves over the years.

By a very broad definition, *art* is a deliberate arrangement of elements that calls forth emotions and refers to human experiences. But which emotions and experiences enhance the artistic value of a work depend on the way *art* is more narrowly defined, and by the end of twentieth century, the scope of the term had widened enormously. The work of artists such as Marcel Duchamp, Andy Warhol, and Jeff Koons helped erode the dividing lines between high art and low art, commercial versus noncommercial work, and elitist versus popular tastes, making it difficult to find consensus as to how exactly *art* should be defined. It may be more useful, then, to consider the ways in which video games can become art and the possibilities for artistic expression within them. Taking their cues from other media forms, video games can be considered as graphic art, time-based art, narrative art, and interactive art.

Like other graphical media, video games contain a visual element that has run the gamut from minimalist abstraction to photo-realistic representational imagery, and every conceivable graphical style can be adapted into video game imagery. Many games tend to gravitate toward certain themes and iconography (such as conflict and weaponry), incarnating established conventions more often than not rather than seeking innovation. Such narrowness of vision is often the result of fiscally conservative companies afraid of taking risks, especially considering the increasing cost of game production and marketing. But a growing variety of authoring tools continue to open up game design to artists and individuals not bound by commercial concerns, and over time, even industrial game development has broadened its stylistic scope and vision, as games such as *Riven* (1997), *Rez* (2002), *Echochrome* (2008), *Limbo* (2010), and *The Last of Us* (2013) can attest.

Innovative graphics and artistic sensibility are most often found in the experimental games of independent developers and artists sojourning from other media, such as Bill Viola and Mark Essen. And just as Roy Lichtenstein used comic book imagery as the subject of his art, video game imagery is likewise becoming the subject of art. Some artists are even using video game systems to produce art, such as Julian Oliver's ioq3aPaint, a drawing program using modified software bots and exploiting the z-buffer in *Quake III: Arena* (1999). The video game has already begun to find its way into the art world as subject matter, art form, and authoring tool, and it will continue to hybridize forms as digital convergence reconfigures traditional notions of art practice boundaries.

Like music, dance, theater, film, radio, and television, video games are also a time-based form of media that involves duration and change. Stasis, movement, transition, transformation, repetition, anticipation, interruption, and closure are some of the devices through which time-based art achieves its effects and retains audience engagement, and video games employ them all, using them in new ways unique to video games. The audiovisual nature of video games also allows them to include the material of other arts within them, such as music and full-motion video (FMV). Again, it should be noted that the video game's potential in the area of time-based art is still far from being realized because only a small number of games, such as *Blinx: The Time Sweeper* (2002), *Braid* (2008), *The Misadventures of P. B. Winterbottom* (2010), and *Life Is Strange* (2015) actively foreground the temporal possibilities available to game designers.

Time-based art, by demanding an audience's ongoing attention for a definite duration, controls the pace of its revelation. Music, film, theater, dance, and so on all withhold and release the experiences contained within them, drawing the audience into rhythms and building expectations and then using these to reveal whatever point or idea they may have to make. Likewise, video games employ the same formal strategies and can achieve similar effects, although most games use them more for entertainment than contemplative purposes.

Video games can also become narrative art. As abstract games like *Tetris* (1985) and *Qix* (1981) have shown, video games need not involve any narrative content at all, but many games do contain at least a rudimentary narrative, which provides some context to a game's action. Although video games have not developed far enough that their narratives have the depth and insight of great literature, the narrative potential of the video game stands out as a rich vein waiting to be mined. Interactivity need not destroy a narrative's certainty and linearity, and even if multiple endings are available, they are all designed by the author who also determines how and when they will appear and what actions will lead to them.

In many cases, player control is something of an illusion arising from apparent free will choices that are actually often either quite limited or have a minimal effect on the game's preordained narrative. In *Riven* (1997), for example, details making up the game's narrative and backstory are scattered throughout the world the game takes place in and even in the very design of the world itself. Yet, although the order in which the player encounters these details may vary, as well as the rate or degree to which they are able to reconstruct the backstory, the story itself does not change. There are multiple endings, but a single ending is privileged as clearly the desirable or "right" one that provides the most narrative closure (as is the case in many games). Player choice, then, is more about how the player encounters the story, not the rewriting of the story.

Even when there are multiple endings with no single ending favored by the author or the way a story is structured, or when a game is clearly open-ended in structure, this in itself is not enough to deny a work the status of art. Ambiguity has always been a part of art, and interactive fiction—also known as *hypertext fiction* and represented by works such as *afternoon, a story* (1990) by Michael Joyce or *Victory Garden* (1992) by Stuart Moulthrop—also involved user interactivity, ambiguity, and multiple endings but is still considered by many to be literature or art. Video games can provide the same kinds of experiences, and with audiovisual material added. In any form of narrative art, it is the narrative itself that is the greatest factor in determining the work's artistic value, and video games are certainly capable of containing narrative art, even though the potential for it still remains largely unrealized. Even stronger than the video game's capacity for narrative, however, is its capacity for interactivity, which is an essential element of it, whereas narrative is not.

In the 1960s, interactive art became a part of the American and European art worlds. Interactive art could involve electronic installations using video images or sounds based on the viewer's involvement or immersive walk-in installations and responsive environments that changed because of a viewer's actions or presence. The 1960s and 1970s saw a great deal of experimentation in which art and technology were combined in collaborations that were constantly in search of new experiences. Electronic music, light shows, "happenings," artworks using live monitor images, and new computer technology provided the means through which interactive art debuted in museums. Some works, such as Myron Krueger's *VIDEOPLACE* (1970), were very much like video games in their design and playful forms of interaction. By the 1980s, when home computer technology appeared that artists could use without needing to collaborate with technicians, video games were widespread and already a part of the cultural landscape. As more artists began to incorporate computers into their artwork, video games and gamelike situations came with them.

Today, video games represent the pinnacle of interactive technology, and the interactive experiences they engender range from casual leisure entertainment to contemplative reflection and experimentation. The very definition of *video game* has itself been broadened by the fluid use of digital technology, specifically computer-generated imagery directed in real time by user control, to include productions in the areas of virtual reality (VR) and augmented reality (AR) as well as proprietary inventions specific to individual art installations. From generative game modifications to video game performance art to mixed-media installations, video games are being integrated into the art world, and stand-alone games are also being accepted as a form of interactive art.

Video games have found acceptance with younger generations of artists who grew up with them and who keep up with technological change and are more aware of the range of their capabilities. Video games provide another tool for artists that, like paint, film, or clay, can be used to create art or be used for other purposes that fall short of being called art. Whether they attain the status of art depends not on their own intrinsic material natures but on those who use them to wield, shape, and construct artwork that incarnates their ideas in material form.

Mark J. P. Wolf

See also: Art; Contemplative Games; Game Design

Further Reading

Clarke, Andy, ed. *Videogames and Art*. Bristol, England: Intellect, 2007.

Jenisch, Josh. *The Art of the Video Game*. Philadelphia: Quirk Books, 2009.

Kelman, Nic. *Video Game Art*. New York: Assouline Publishing, 2006.

Morris, Dave, and Leo Hartas. *The Art of Game Worlds*. New York: HarperCollins, 2004.

Morris, Dave, and Leo Hartas. *Game Art: The Graphic Art of Computer Games*. New York: Watson-Guptill, 2003.

Artificial Intelligence (AI)

Artificial intelligence (AI) in video games refers to algorithms that govern the behavior of computer-controlled agents designed to create meaningful interactions between the system and a human player. (This is a separate and distinct definition from AI seen outside of video games and such as that used in computer science.) The most common form of video game AI is the control of computerized opponents that are designed to compete with the human player in a manner mimicking human behavior.

HISTORY

The first video games did not feature any form of AI; all action in the game was a direct result of human input. Early titles such as *Spacewar!* (1962) and *PONG* (1972) were entirely controlled by user actions and featured no computer agents, thus requiring two people to play.

In the 1970s, the first single-player games with enemy agents were created. These agents followed stored behavior patterns that dictated their movement and actions. Some of the more advanced agents partially based their behavior on player actions. A noteworthy example of this behavior is the four ghosts in *Pac-Man* (1980). When pursuing Pac-Man, each of the ghosts obeyed a different rule set, with three of the ghosts basing their movement decisions on the player's location. This led to a complex cat-and-mouse maze chase and a sense of enemy personality.

Two of the main roadblocks to powerful video game AI are limited processing power and computer memory. As both improve, developers can create more complex and robust AI implementations. In 1997, a chess-playing computer, IBM's Deep Blue, bested a reigning world chess champion for the first time when it defeated Garry Kasparov in a highly publicized set of six games.

In recent years, increasingly sophisticated AIs have been developed to compete with and challenge players. The majority of modern video games feature AI in some shape or form: fighting games and racing games feature AI opponents with variable ability levels, platform games and puzzle games often feature enemy and boss AIs with set patterns, and real-time strategy games and sports games feature a large number of computer-controlled agents, each of which has its own goals and abilities.

COMMON PROBLEMS SOLVED WITH AI

The following are some of the problems typically tackled by video game AI. Many games feature agents that address multiple issues simultaneously.

Turn-based opponents: These types of AI agents are often employed in video game adaptations of board games. On each turn, agents strive to increase their chance of success while minimizing their opponent's based on some internal heuristic. Because of the nature of their implementation, AIs tend to fare much better at games with a smaller set of finite states. Relatively strong programs have been written to play chess and checkers, but currently there are no strong programs for playing Go, which has a much larger set of possible game states.

Path-finding: In movement-centered games, path-finding is frequently a critical aspect of AI implementation. Agents must navigate terrain in an attempt to find the shortest, fastest, or cheapest path from one point to another. Some games, such as *Desktop Tower Defense* (2007), feature path-finding as a core game mechanic.

Personality: A critical aspect of game AI is whether the agent feels like a person (as opposed to a computer system) to the user. Good AIs frequently take suboptimal actions, behave in a manner that is more focused on enriching the player experience rather than the AI's chance of "winning," or avoid actions that will result in "stupid" behavior. Well-implemented AIs can exhibit individual personalities that seem different from one to the next. A noteworthy example of an AI personality is the AI Director in *Left 4 Dead* (2008), which modifies enemy spawning to create a tense atmosphere and keep the gameplay exciting.

Learning: Learning algorithms can change an agent's future behavior based on past events. *Nintendogs* (2005) used learning algorithms to dictate the behavior of the player's pet and had the benefit that AI mistakes added to personality, making the pet seem more realistic. Games with motion controls or camera controls can also use learning algorithms to calibrate the system and adjust their control schemes based on player movement. As games get more advanced, it is likely that these techniques will be increasingly used to implement a growing array of agents.

IMPLEMENTATION AND "CHEATS"

Some of the more basic and well-known techniques used to implement AIs are min-max algorithms for choosing actions, A* (known as *A-star*) and Dijkstra's algorithm for path-finding, and neural networks and genetic algorithms for learning. AIs are often given a set of goals to pursue that determines their actions, and changing the preference of the AI to pick a given goal can lead to perceived personality.

A common development practice is to "cheat" and give an agent information that would not be readily available to a human opponent to circumvent difficult design and implementation challenges. For instance, an AI opponent that has trouble tracking a human player through a large branching maze might simply be "told" where the player is at all times. Conversely, it may be necessary to "dumb down" an AI opponent to make its behavior feel more realistic. An agent can likely execute attacks with perfect timing or aim a weapon with perfect precision, so introducing some amount of error makes the agent seem more human.

Eitan Glinert

See also: Strategy Games

Further Reading

Buckland, Mat. *Programming Game AI by Example*. Burlington, MA: Jones & Bartlett Learning, 2004.

Millington, Ian. *AI for Games*. 3rd ed. New York: CRC Press, Taylor & Francis, 2019.

Rabin, Steve. *Game AI Pro 3: Collected Wisdom of Game AI Professionals*. New York: A. K. Peters/CRC Press, Taylor & Francis, 2017.

Asheron's Call

The massively multiplayer online role-playing game (MMORPG) *Asheron's Call* (1999) was one of the first "big three" MMORPGs in the late 1990s, along with *Ultima Online* (1997) and *EverQuest* (1999). Developed by Turbine International Entertainment and published by Microsoft (1999–2004), Turbine (2004–10), and Warner Bros. Interactive Entertainment (2010–17), *Asheron's Call* was launched on November 2, 1999, and had 80,000 players by the end of the year. The game had a peak number of players in 2002, at around 120,000 subscribers, after which the number declined until subscriptions eventually fell below 10,000 players. *Asheron's Call* ran continuously until January 31, 2017, when it was finally shut down, and characters dissolved into purple mists (Zak 2018).

The story of *Asheron's Call* took place on the planets Ispar and Auberean, the latter of which was the location of Dereth, the island continent where much of the story takes place. Asheron Realaidain is a member of a royal family and the last remaining member of a council that was destroyed when the members sealed a villain, Bael'Zharon, into another plane of existence. Players' avatars entered the game as one of three races, the Aluvians, the Sho, or the Gharu'ndim, and worked with Asheron against the evil Olthoi, who were enslaving humans arriving in Dereth. An expansion, *Dark Majesty*, was released in 2001 and added Viamontians as another character race.

Asheron's Call redefined PvP (player versus player) combat by taking a different approach to it than its contemporaries and integrating its player killer and non-player killer communities within the game (Zhulin 2003). *Asheron's Call* also had a unique "patron" and "vassal" system, wherein less-experienced players became vassals to more experienced players. Each patron could have up to twelve vassals, and the vassals themselves could become patrons, leading to enormous trees of affiliated player characters, which affected gameplay due to player loyalty. According to *Asheron's Call* designer Jesse Kurlancheek, "This tree structure gave individual players a large amount of power in the allegiance. In other games, if someone wasn't getting along in the guild, they could be removed and that'd be it, but in a large sprawling tree, removing a single person might send hundreds or thousand[s] of players with them. To build in relationship structures and not just expect social systems to work on their own was just so strong" (Klepek 2017). Such relationships also resulted in a very dedicated fanbase and community.

Asheron's Call won Best Game awards in 1999 from CNET's Gamecenter, Gameindustry.com, Gamezilla, and Gamersvoice, although it remained behind *Ultima Online* and *EverQuest* in the number of subscribers. A sequel, *Asheron's Call 2: Fallen Kings*, ran from 2002 to 2005 and then from 2012 to 2017, when it, too, was shut down.

Mark J. P. Wolf

See also: Massively Multiplayer Online Role-Playing Games

Further Reading

Klepek, Patrick. “As ‘Asheron’s Call’ Nears Death, One Designer Looks Back: After 17 years, the Curtain Is Closing on ‘Asheron’s Call.’ A Lot Can Happen in Nearly Two Decades.” Vice, January 31, 2017. Available at https://www.vice.com/en_us/article/wnznvq/as-asherons-call-nears-death-one-designer-looks-back.

“The Last Moments of Asheron’s Call.” *PC Gamer*, January 31, 2017. Available at https://www.youtube.com/watch?v=o77BL-hCHxA.

Zak, Robert. “The Asheron’s Call Outcasts Searching for New Worlds to Call Home: After the Servers Finally Closed Down, Where Did the MMO’s Faithful Players Turn Next?” PC Games^{N}, January 4, 2018. Available at https://www.pcgamesn.com/asherons-call/asherons-call-mmo-project-gorgon.

Zhulin, Vasiliy. “Asheron’s Call: Redefining the Role of Player Killing.” March 18, 2003. Available at https://web.stanford.edu/group/htgg/sts145papers/vzhulin_2003_1.pdf.

Association for UK Interactive Entertainment (UKIE)

The Association for UK Interactive Entertainment (UKIE; renamed in 2010 from the Entertainment and Leisure Software Publishers Association [ELSPA]) is a trade organization that primarily represents software publishers and distributors in the computer and video game industry in the United Kingdom. The UKIE was founded as ELSPA in 1989 and primarily comprises companies from the U.K. and European video games industry (it was established as the European Leisure Software Publishers’ Association before being renamed to “Entertainment” in 2002). In many respects, the UKIE is comparable in form and function to the larger American trade organization the Entertainment Software Association (ESA; formerly the Interactive Digital Software Association). UKIE constitutes one of the two primary trade associations for the British and European games industry, along with the Independent Game Developers’ Association (TIGA).

Membership in the UKIE has grown considerably since its inception as the ELSPA in 1989, from 11 founding members to 410 members in 2018. The association’s stated goal is to “support, grow, and promote, our members’ businesses and the wider UK games and interactive entertainment industry.” (The Association for UK Interactive Entertainment website n.d.). UKIE functions in multiple capacities, including organizing conferences and events, such as the now defunct European Games Network Event (last held in 2004 and similar to the Electronic Entertainment Expo), the London Games Festival (an annual weeklong event focused on industry promotion, business development, and workshops), and the Edinburgh Interactive Festival (similar to the London Game Festival). As a trade organization, the UKIE provides services for its members through industry promotion and public relations, governmental lobbying for legislative issues and economic support, and advertising and content self-regulation. Furthermore, the UKIE operates specific support mechanisms, such as UKIE IP services, which assists with enforcement and provides protection for intellectual property for the games industry against software piracy and copyright infringement, and consumer information programs, such as Askaboutgames.com. The UKIE also compiles and produces weekly, monthly, quarterly, and annual sales charts for the UK computer and video games markets, and in 2016 it introduced the UK Games Map to track the games industry's growth in the United Kingdom.

With the aid of the Video Standards Council, the ELSPA established a voluntary self-rating system for video games beginning in 1993. The association oversaw game ratings in the United Kingdom from 1993 until 2010, functioning in a role similar to the Japanese Computer Entertainment Rating Organization and the American Entertainment Software Ratings Board (ESRB). Following the passage of the Digital Economy Bill in 2010, rating responsibilities in the United Kingdom were then passed to the Pan European Game Information (PEGI) group. The UKIE has also supported educational initiatives to explore the instructive potential of games, in conjunction with the British Educational Communications and Technology Agency (BECTA). As of 2019, the UKIE chair is Noirin Carmody of Revolution Software, and board members include representatives from the British and European branches of Activision Blizzard, Disney, Electronic Arts, Microsoft, Nintendo, Sony, Ubisoft, and ZeniMax Media.

Christopher Hanson

See also: United Kingdom

Further Reading

Ask About Games website. Accessed September 1, 2020. Available at http://www.askaboutgames.com.

Association for UK Interactive Entertainment website. Accessed September 1, 2020. Available at http://ukie.org.uk/.

The Independent Games Developers Association website. Accessed September 1, 2020. Available at http://www.tiga.org.

UK Games Map. Accessed September 1, 2020. Available at http://ukie.org.uk/tags/uk-games-map.

Atari

Atari, Inc., is a company that played a pivotal role in the development of nearly all aspects of the video game industry. During the 1970s and early 1980s, platforms and games designed at Atari contributed to the growth of the arcade and home console markets, with a dedicated consumer base emerging around the success of early arcade games such as *PONG* (1972) and home consoles such as the Atari VCS 2600. Atari games broke sales records and fundamentally influenced the future of game design. Early Atari games established video game genres still prominent today, and competitors readily adapted successful Atari titles, minimally altering gameplay and releasing these games as their own.

The engineers who created and managed Atari are today considered the pioneers of the video game industry, and the design principles they established are still evident in the contemporary game industry. For example, Atari released multiple iterations of popular games and adapted successful properties across platforms, an early precursor to the creation of multiplatform franchises commonplace today. Atari's business practices also presaged the ways in which the contemporary video game industry functions in relation to other media industries, such as the film industry, because the games Atari produced created a revenue stream that rivaled Hollywood's, and several Atari titles were video game adaptations of popular films and early examples of multimedia synergy. In terms of platform design and game development, Atari provided a foundation on which a successful video game industry—and culture—could emerge, even if Atari's own practices sometimes destabilized the very industry it helped establish.

A remake of the joystick for the Atari VCS 2600. Note the three red buttons on the side; the original design did not have these three buttons. (Jerry Coli/Dreamstime.com)

Nolan Bushnell and Ted Dabney initially founded Syzygy, each providing an investment of $250 in November 1970 to develop *Computer Space* (1970), an adaptation of *Spacewar!* (1962). They licensed the game to Nutting Associates in 1971, and both Bushnell and Dabney went to work for Nutting to facilitate the manufacture of the game. They left Nutting in March 1972, and with royalties from *Computer Space* and a contract for a driving game from Bally/Midway, Bushnell and Dabney started a new company in a rented thousand-square-foot building in Santa Clara, California. They incorporated Atari on June 27, 1972, and hired engineering student Al Alcorn as a game designer, whom they had worked with at Ampex Corporation, a Northern California engineering company. (Much of Atari's early staff was recruited from within Ampex, where Bushnell had also worked as an engineer.) Other notable employees from Atari's early years include Steve Bristow, Atari's future vice president of engineering; Steve Mayer and Larry Emmons, who ran a consulting firm (owned by Atari) that served as a company retreat in Grass Valley, California; and Steve Wozniak and Steve Jobs, who designed *Breakout* (1976) and would release the Apple II in 1977. Bushnell later hired his next-door neighbor, Joe Keenan, who was the marketing manager for a local time-sharing company. Keenan became president of both Atari and Kee Games (the latter a company that Atari wholly owned and created in 1974 to get around exclusive distribution contracts). At the time, the design of arcade games was an individual process, and Atari's engineers overcame complex hardware and software limitations to create games that were both strikingly unique and addictively replayable.

Al Alcorn's *PONG*, Atari's first arcade game and the first commercially successful video game, was released in September 1972 as a prototype at Andy Capp's Tavern in Sunnyvale, California. Bushnell attempted to give *PONG* to both Bally and Midway to manufacture and distribute, in satisfaction of their design contract; when they hesitated, he instead decided that Atari would itself manufacture *PONG*'s arcade cabinet, given the prototype's success (the profits of an individual *PONG* cabinet were approximately $200 a week in 1972, whereas other coin-operated machines netted between $40 and $50). Bushnell's decision importantly positioned Atari as a company that both produced and manufactured its own games and game hardware; third-party manufacturers were unnecessary in Atari's early business model.

PONG's success led to a patent lawsuit with Magnavox based on the patents Ralph Baer filed while working at Sanders Associates. Although many ping-pong games had been programmed on the PDP-1 in the 1960s, Magnavox asserted that *PONG* was exceptionally similar to the electronic ping-pong game Baer had produced for the Magnavox Odyssey earlier that same year. Bushnell had attended an Odyssey demonstration at a Burlingame, California, trade show on May 24, 1972, and later stated that he was reminded of the simple nature of the electronic ping-pong genre, assigning the game's design to Alcorn (who had just started at Atari) as a training exercise. Alcorn and Bushnell added many improvements that made *PONG* a success and differentiated the game from its contemporaries. The litigation against Atari on the grounds of patent infringement resulted in an advantageous out-of-court settlement in which Atari gained a paid-up license for less than the cost of litigation. Because numerous game developers used Atari's technology following *PONG*'s success (Dabney and Bushnell had their own patents on the more sophisticated digital sideslip technology, which allowed for high-resolution graphics), these companies had to pay large royalties.

Although Atari would release several versions of *PONG* that altered gameplay only slightly, numerous other Atari arcade releases positioned the company as a source of originality in game design. An increasingly competitive marketplace grew from Atari's initial achievements, with other companies frequently adapting or simply rebranding successful Atari titles as their own games. Bushnell's response to such competition was to produce games that were recognizably unique, differing wholly in both concept and design from previous Atari successes. Early notable Atari arcade games include *Space Race* (1973), the early maze game *Gotcha* (1973), the racing game *Gran Trak 10* (1974), Steve Bristow and Lyle Rains's *Tank* (1974), Steve Jobs and Steve Wozniak's *Breakout* (1976), Lyle Rains and Ed Logg's *Asteroids* (1979), *Lunar Lander* (1979), Ed Rotberg's *Battlezone* (1980), Logg and Dona Bailey's *Centipede* (1981), and Dave Theurer's *Missile Command* (1980) and *Tempest* (1981).

Finding initial success in the coin-operated arcade, Atari became the only company involved in all three branches of the video game industry, producing both home console systems and home computers in addition to designing and manufacturing arcade games and cabinets. Atari successfully marketed a *Home PONG* system through Sears in 1975, but increasing competition in the home video game marketplace necessitated a platform that could play more than just one game. The Atari VCS 2600, released in October 1977, greatly influenced the growth of the home console market and, along with other home consoles, such as the Fairchild/Zircon Channel F and the Coleco Telstar (both from 1976), further established the private space of the home as an appropriate place to play video games.

The VCS allowed players to interchange games stored on individual cartridges and interact with them primarily through a single-button joystick. The VCS surpassed the Channel F's sales in 1977, contributing to Atari's $75 million revenue that year. As the VCS's popularity grew, so did Atari's returns, reaching $2 billion by 1980. Upon its release in 1977, the VCS had nine titles, including *Combat* (an adaptation of Atari's arcade hit *Tank!* [1973]), the shooting game *Air-Sea Battle*, and the racing game *Indy 500*. Later notable VCS titles that Atari produced include Warren Robinett's *Adventure* (1979), the home console port of *Space Invaders* (arcade version, 1978; home version, 1980), Howard Scott Warshaw's *Yar's Revenge* (1981), Tod Frye's port of *Pac-Man* (arcade version, 1980; home version, 1982), and Warshaw's infamous adaptation of Steven Spielberg's *E.T.: The Extra-Terrestrial* (1982).

After the VCS's introduction, work immediately began on faster 8-bit machines that featured keyboards instead of joysticks and included a version of the Microsoft BASIC programming language, Atari BASIC. These computers were released as the Atari 400 and Atari 800 in 1979, and Atari would continue to develop personal computers into the 1990s, including the Atari ST series originally released in 1985. The VCS's popularity also allowed Atari to design and manufacture more technically advanced dedicated gaming consoles, such as the Atari 5200, released in 1982.

During Atari's early years, the company's success led to changes in ownership and management. In 1976, Bushnell sold Atari to Steve Ross's entertainment conglomerate Warner Communications for $28 million to secure funding for the VCS's production. Bushnell remained as chief executive officer until 1978, when disputes between Bushnell and Warner executives led to Bushnell being dismissed over strong disagreements of the future direction of Atari, including the development of the 2600's successor, the strategy for Atari's pinball division, and plans to manufacture all the software for Atari's personal computers in-house, a strategy intended to freeze out third-party developers. Warner's Ray Kassar became CEO, and administrative changes led to personnel changes as well. The perceived lack of recognition that Kassar's Atari paid to its game designers led Atari programmers David Crane, Alan Miller, and Bob Whitehead to join venture capitalist Jim Levy in founding third-party developer Activision in 1979, which would go on to produce influential VCS titles such as *Barnstorming* (1982), *Grand Prix* (1982), and *Pitfall!* (1982).

After the video game industry crash of 1983, blamed partially on the excessive production of poorly designed games epitomized by Atari's own *E.T.: The Extra-Terrestrial* (1982), Atari was split into two companies: Atari Games Inc., which received ownership rights to Atari's arcade games, and Atari Corporation, which controlled Atari's consumer electronics division. Atari Corporation would release the Atari 7800 ProSystem in 1986, the handheld Atari Lynx in 1989, and the 64-bit Atari Jaguar home console in 1993. The Lynx and Jaguar's lack of success resulted in Atari Corporation's sale to hard disk manufacturer JTS Inc. in 1996 and then to the toy company Hasbro in 1998.

In 2001, software developer Infogrames purchased Hasbro Interactive, rebranding its North American distribution arm Atari, Inc. In March 2008, Infogrames began purchasing all remaining public shares of Atari, Inc., a process completed in October of that same year, making Atari, Inc., a wholly owned, privately held subsidiary of Infogrames. In May 2009, Infogrames Entertainment officially changed its corporate name to Atari SA, reflecting a brand unity between the company and its subsidiaries. In April 2010, Nolan Bushnell joined Atari SA's board of directors, returning to a managerial position in the company he had created almost four decades before.

Although Atari today differs drastically from the company Bushnell and Dabney incorporated in 1972, the games and platforms Atari produced are understood as fundamental to the development of video game culture and history. Ported to more advanced systems, early Atari games are repackaged and resold today in the form of classic collections and anthologies, such as Digital Eclipse's *Atari Anthology* (2004) released for the Microsoft Xbox and Sony PlayStation 2, and in the forthcoming Atari VCS, a home video game console and computer system set to be released by Atari SA in 2019. Preloaded with classic Atari games and paying homage to the original Atari VCS 2600 in its aesthetic design, it also allows players to download new titles via an internet connection, outputs graphics in high definition, and runs on a Linux operating system. As such, the Atari VCS nostalgically recalls Atari's past while heralding its future.

Historians and theorists have written extensively on Atari, discussing its role within the video game industry's development and analyzing the technical and representational influence Atari's consoles and games have had on contemporary games and game culture. Scott Cohen's *Zap!: The Rise and Fall of Atari* (1984) provides a comprehensive discussion of the mitigating factors that led to Atari's success and decline, whereas Steven L. Kent's *The Ultimate History of Video Games* (2001) offers significant insight into the intentions and practices of several important Atari designers, including illuminating excerpts from interviews Kent conducted with Nolan Bushnell and Al Alcorn. Nick Montfort and Ian Bogost's *Racing the Beam: The Atari Video Computer System* (2009) presents a design history of individual VCS titles and productively theorizes the interrelationship between platform technology, game design, game aesthetics, interactivity, and game culture.

Harrison Gish

See also: Atari 5200; Atari Jaguar; Atari Lynx; Atari 7800 ProSystem; Atari VCS 2600

Further Reading

Cohen, Scott. *Zap!: The Rise and Fall of Atari*. New York: McGraw-Hill, 1984.

Herz, J. C. *Joystick Nation: How Videogames Ate Our Quarters, Won Our Hearts, and Rewired Our Minds*. London: Little, Brown and Company, 1997.

Kent, Steven L. *The Ultimate History of Video Games: From Pong to Pokémon and Beyond*. New York: Three Rivers Press, 2001.

Montfort, Nick, and Ian Bogost. *Racing the Beam: The Atari Video Computer System*. Cambridge, MA: MIT Press, 2009.

Atari, Inc. v. North American Philips Consumer Electronics Corp.

Atari, Inc. v. North American Philips Consumer Electronics Corp. was a lawsuit in which Atari, who had a license to make a home version of *Pac-Man,* sued Philips for releasing a similar game called *K. C. Munchkin*. The ruling would be the first time that a court decided on the issue of “look and feel” of software that would be at issue in numerous other cases, including cases between Apple and Microsoft over the Windows operating system’s similarities to Mac OS and would go on to guide game makers’ ability to “make competing video games of the same general type as an existing game as long as the later game does not copy the expression found in the original game” (Graham 1999).

Pac-Man was created by Namco in Japan in 1979 and was released in North America in 1980 by Midway. In 1978, Atari had gained a license to make home versions of all Namco arcade games, and so Atari quickly started working on a version of *Pac-Man* for the 2600 (Kent 2001).

Before Atari could release its version, other companies began selling countless *Pac-Man* clones and knock-offs. Atari was successful in suing obvious knock-offs, such as Arcade Plus’s *Ghost Hunter* (1981) and Online Systems’ (later renamed to Sierra Online) *Gobbler* (1981) and *Jawbreaker* (1981) (Kunkel 2003; Markoff 1981). Given Atari’s success at suing makers of *Pac-Man* clones, it was no surprise when Atari sued Philips, the makers of *K.C. Munchkin* (1981). However, Atari’s case against *K.C. Munchkin* was more complicated because that game made several changes to the basic *Pac-Man* formula.

K.C. Munchkin was like *Pac-Man* in that it was “a maze-chase game” in which the player controls a character that “gobbles” dots, is chased by creatures, and uses power-ups (*Atari, Inc. vs. North American Philips Consumer Electronics Corp.* 1982). *K.C. Munchkin* differs from *Pac-Man* in that K.C. Munchkin has legs, is teal colored, and the game "has only twelve dots compared to the over two hundred dots in Pac-Man," and "the K.C. Munchkin dots are randomly spaced, rectangular, and continuously moving, whereas the Pac-Man dots are evenly spaced, round, and stationary" (*Atari, Inc. vs. North American Philips Consumer Electronics Corp.* 1982).

Although the Northern District Court of Illinois found that *K.C. Munchkin* was different enough from *Pac-Man* that it could continue to be sold, Atari appealed the decision to the Seventh Circuit Court of Appeals, which sided with Atari and barred Philips/Magnavox from selling *K.C. Munchkin*. In doing so, the court ruled that although "there is no litmus test by which to apply the idea-expression distinction," and "K.C. Munchkin's maze design, scoring table, and 'dots' are sufficiently different to preclude a finding of infringement on that basis alone," the fact remains that having a main character that gobbles up dots and is chased by monsters is a concept that "distinguishes PAC-MAN from conceptually similar video games" (*Atari, Inc. vs. North American Philips Consumer Electronics Corp.* 1982).

Bryan-Mitchell Young

See also: *Pac-Man*

Further Reading

Atari, Inc. vs. North American Philips Consumer Electronics Corp., 672 Federal Reporter, Second Series 610 (US Court of Appeals for the Seventh Circuit 1982).

Graham, L. D. *Legal Battles That Shaped the Computer Industry*. Westport, CT: Quorum, 1999.

Kent, Steven L. *The Ultimate History of Video Games: From Pong to Pokémon and Beyond*. Roseville, CA: Prima, 2001.

Kunkel, B. "My Three Trials: Part One: Atari v. Magnavox." GoodDealGames.com, 2003, Available at http://www.gooddealgames.com/articles/Three_Trials_Part_1.html.

Markoff, J. "Atari Attempts to Gobble Software Competition." *InfoWorld* 3, no. 31 (December 21, 1981): 1.

Atari 5200

The Atari 5200 (also known as the Atari 5200 SuperSystem) was a second-generation (see Generations of Technology) game console released by Atari, Inc., in November 1982. The system was developed as a replacement for the aging Atari VCS 2600 platform, and its name was chosen to suggest that it was twice as powerful as its predecessor.

The hardware design was based on and very similar to (but not compatible with) that of Atari's 400/800 line of 8-bit home computers. At the heart of the system was a custom 6502C CPU (based on the popular MOS Technology 6502 chip), operating at the speed of 1.79 MHz. The 5200 had 16 KB of random-access memory (RAM) and was capable of addressing up to 32 KB of read-only memory (ROM). It featured four semi-independent sound channels and could display 256 colors at the maximum screen resolution of 320-by-192 pixels. Software was distributed on cartridges.

The original design sported four controller ports as well as an innovative automatic RF switchbox: the power supply plugged into the switchbox rather than directly into the console, and the TV was automatically switched from antenna to game input upon system power-up. Both features were soon eliminated in an effort to reduce manufacturing costs. The 1983 redesign included only two controller ports and replaced the automatic switchbox with a conventional manual one.

The iconic Atari CX-40 digital eight-way joystick was replaced with a new controller, featuring a fully analog stick, a numerical keypad, and start, reset, and pause buttons. Although the stick was capable of full 360-degree movement and precise positioning, it was marred by a critical design flaw. Rather than a metal spring, a cheap rubber boot was used to hold it in neutral position. As a result, the controller would not self-center properly (or, after extended use, at all), which often translated into a frustrating gameplay experience, especially with titles requiring precise four-way input.

The 5200 was not commercially successful. Because the sales of the 2600 were still fairly strong, Atari was not willing to commit exclusively to the new platform. Consequently, throughout its short life span, the system was competing for development resources with its older sibling. In addition, many of the initial games were mere cosmetic updates of existing 2600 titles and did not fully utilize the capabilities of the new hardware. Because the 5200 was not backward compatible, 2600 owners had little incentive to upgrade. A VCS Cartridge Adaptor was eventually released in 1983 but not before Coleco released a similar device for the ColecoVision.

Perhaps the greatest contributing factor in the 5200's failure, however, was competition from 8-bit home computers, including Atari's own 400/800 line. In December 1982, a $50 rebate from Atari brought the retail price of the 400 series computers to under $200. Combined with access to an extensive library of entertainment, educational, and productivity software, this gave the home computers considerable advantage over a $250 dedicated game machine, especially in the wake of the video game crash of 1983. The system was discontinued in 1984.

P. Konrad Budziszewski

See also: Atari; Atari VCS 2600

Further Reading

Cohen, Scott. *Zap!: The Rise and Fall of Atari*. New York: McGraw-Hill, 1984.

Vendel, Curt, and Marty Goldberg. *Atari Inc.: Business Is Fun*. Carmel, NY: Syzygy Press, 2012.

Atari Jaguar

After its rise and fall during the golden age of gaming, Atari attempted a comeback with the Atari Jaguar, the company's entry into the more advanced games industry of 1993. However, that hoped-for success never came to fruition, but then fate intervened.

The Atari Jaguar seemed off to a solid start. A large number of developers were initially impressed with the hardware, and many signed up to develop titles or offered popular intellectual properties and licenses to Atari. The hardware was far superior to its 16-bit predecessors, and consumers were anxious for the next generation of video game systems. The cartridge-based machine was well priced at only $249.99. Atari had secured a strong partnership with IBM, which was to make the console's hardware, bringing game console manufacturing back to the United States for the first time in years.

Technologically, the Atari Jaguar used several processors, a rather revolutionary idea at the time. Although now a common design practice in game hardware, an architecture of multiple processors proved difficult for game developers of the early 1990s. The unit housed five processors that resided within three chips, two of which were proprietary and named after the popular MGM cartoon cat and mouse, Tom and Jerry. Tom featured a 32-bit graphics processor, a 64-bit object processor, and a 64-bit blitter graphics chip, and Jerry paired sound and input/output and also included a digital signal processor.

The Jaguar also included the 16-bit Motorola 68000 coprocessor that was popular at the time and previously used in Atari's own ST line of computers. The inclusion of this chip, already familiar to developers, helped them make the transition to more complex architecture; however, it turned out to be a crutch instead, because several developers chose to use only that particular chip. As a result, many developers did not take advantage of the full power of the hardware, thus allowing for subpar games to be released or ported to the console. This was a trend that would haunt Atari and ultimately prevent the Jaguar's success in the marketplace.

Although the Jaguar was a 64-bit reduced instruction set computing (RISC)–based processor at its core, the use of several chips with different specs also allowed the market to question the true nature of the insides of the Jaguar. The competing game systems of the time were primarily 16-bit machines, so Atari essentially skipped the 32-bit stage and moved directly to the 64-bit level. The company even tried to capitalize on this with its "Do the Math" slogan, implying that their 64-bit system had more under the hood than their 16-bit and 32-bit competitors.

The Atari Jaguar premiered in a handful of cities, including New York and San Francisco, in late November 1993 and reached the remainder of the United States and foreign markets the following year. The unit was packaged with the game *Cybermorph* (1993), which received favorable reviews from most of the press at the time. However, only a few games, all of subpar quality, trickled out during the remainder of 1994 and proved to be a case of too little, too late for Atari.

The Atari Jaguar did have moments of glory. *Alien v. Predator* (1994) was a huge success showcasing the system's capabilities. In addition, the Jaguar premiered the *Iron Soldier* (1994) series and Ubisoft's immensely popular *Rayman*

(1995) franchise, which are still admired today.

In mid-September 1995, Atari released a double-speed CD-ROM peripheral for the Atari Jaguar for an additional $199.99. It sat atop the console and was attached to the Jaguar unit through the cartridge slot. It could play games requiring storage of up to 790 megabytes of data, more than the usual CD-ROM formats. The unit could also play audio CDs and CD-G format discs. The unit was packaged with *Blue Lightning CD* (1995), a sequel to the popular Atari Lynx game of the same name from 1989; *Vid Grid* (1995); a demo of *Myst* (1993); and an audio CD soundtrack for *Tempest 2000* (1994).

The unit also included the Virtual Light Machine (VLM) built directly into the unit. The VLM displayed a variety of visual effects based on input from an audio CD and was programmed by the well-known programmer Jeff Minter, who also programmed *Tempest 2000*, the remake of Atari's arcade game *Tempest* (1981). If the device had been offered back in 1993, when it was originally supposed to be released, it might have been more successful. However, after it launched six days behind the Sony PlayStation, time was running out for the Atari Jaguar.

Several other add-on peripheral devices were also released for the Jaguar. A networking device known as the JagLink allowed multiple players to compete against one another from more than one Jaguar unit, and the Memory Track cartridge allowed the Jaguar CD to save game progress, preferences, and high scores.

Other revolutionary projects were announced for the Jaguar but never reached production: a PC card, developed by Sigma Designs, that would have allowed PC owners to play Jaguar games on their home computer; an MPEG video cartridge that would allow full-motion video (FMV) playback; and a voice modem that would allow players to speak to each other while playing from different locations. The most promising and biggest disappointment of the shelved peripherals, however, was the virtual reality (VR) headset. It was being developed in conjunction with the VR coin-op company Virtuality and had really excited the market. The headset was to feature infrared head-tracking capabilities, but in the end, it became another case of Atari vaporware.

COJAG, short for "Coin-Op Jaguar," was a modified Jaguar chipset system used briefly in the arcade industry. A handful of titles were being developed for the system, but only the light gun games *Area 51* (1995) and *Maximum Force* (1997) ever reached operators.

The Jaguar was on the market at the same time as the SEGA Genesis, the Super Nintendo Entertainment System (SNES), and the 3DO Interactive Multiplayer. The SEGA Saturn was looming around the corner, and Sony was about to unleash the juggernaut that was the PlayStation. With fierce competition and a minimal operating budget compared to their competitors, Atari simply could not compete. The Jaguar was Atari's final console release and left the market with a whimper in 1996. Later, when the Atari name and assets were bought by Hasbro, the Jaguar was declared an open system, allowing homebrew games for the system to be developed.

Michael Thomasson

See also: Atari

Further Reading

Forster, Winnie. *The Encyclopedia of Game Machines*. Utting, Germany: Gameplan, 2005.

Herman, Leonard. *Phoenix IV: The History of the Videogame Industry*. Springfield, NJ: Rolenta Press, 2017.

Atari Lynx

R. J. Mical and Dave Needle, two engineers commissioned by the computer software company Epyx, originally dreamed up the world's first color handheld game system that would eventually become the Atari Lynx. Handy, as it was originally labeled, benefited from their previous experience designing the Amiga computer. Development on the portable unit began in 1987 and was first revealed to industry insiders during the Las Vegas Winter International Consumer Electronics Show (CES) in January 1989.

While Needle and Mical were working on the system's architecture, Epyx began to stumble financially. By the time the unit was ready, Epyx no longer had the assets to go it alone. The company approached Nintendo to garner support, but the gaming giant had its own handheld in the works and declined, as did SEGA. Atari, seeing an opportunity to regain some of its former glory, penned a deal with Epyx to publish the console as the Atari Lynx. The following April, Nintendo's Game Boy launched in Japan, followed by a North American launch in July.

The Game Boy featured a dark olive dot matrix screen that could only be played in direct light, and the system's architecture featured an 8-bit central processing unit (CPU). In comparison, Atari's Lynx, which launched in North America a little over a month later, could display 16 colors from a palette of 4,096 colors on a screen almost twice the size of the Game Boy's screen. Furthermore, the Lynx boasted a backlit screen, allowing it to be played in any lighting condition, including total darkness. The Lynx's 16-bit CPU was more than twice as powerful as the Game Boy and could also perform sprite scaling and other advanced hardware tricks that even home consoles such as SEGA's Genesis could not match.

Unfortunately for Atari, Nintendo's Game Boy was much more efficient. The Lynx could only operate three to five hours using six AA batteries, while the Game Boy would operate for up to thirty hours using only four AA batteries. For a handheld system that is meant to be mobile, the Game Boy was more reliable and durable, cost much less to operate, and was small enough to fit into a pocket. On the latter note, the Lynx was mostly hollow inside. Smaller units were designed, but focus group results favored the larger, more substantial unit.

The Atari Lynx was a feature-rich device. In addition to its fast CPU and graphical wizardry, it allowed up to sixteen players to "Lynx-Up" simultaneously for multiplayer fun. That was the technical limit of the hardware, but no software ever maxed out its capability. *Todd's Adventure in Slime World* (1990) allowed up to eight players to network together. Nearly half of the Lynx library allowed Lynx units to be daisy-chained together using ComLynx cables.

The Lynx also sported a few simple but nice low-tech features. The Lynx offered an ambidextrous layout. The buttons were mirrored on both sides of the monitor, so left-handed players could simply rotate the device 180 degrees and invert the screen to play more comfortably. Many arcade games enjoyed a long vertical-oriented screen. Certain Lynx titles were deliberately engineered to take advantage of this by allowing the player to rotate the Lynx unit 90 degrees. Titles such as *Gauntlet: The Third Encounter* (1990), *Klax* (1990), *Raiden* (1990), and *NFL Football* (1992) took advantage of this approach.

The downside of having so many bells and whistles is that it made for a pricey endeavor for consumers. Nintendo's Game Boy premiered at $89.99, while the Lynx's sticker price was twice the amount.

The Lynx had a strong library and some impressive software, including exclusive popular arcade ports such as *S.T.U.N. Runner* (1989) and *Hydra* (1992). However, the Game Boy was packaged with the runaway blockbuster killer app *Tetris* (1984) and had so much market share that most third-party software providers flooded Nintendo's handheld with an absolutely enormous amount of software. Atari's Lynx received just over six dozen games, while the original Game Boy was home to over a thousand Game Paks. Consumers like choices, and Atari simply could not compete on such a scale.

In December 1990, NEC released the TurboGrafx-16 compatible TurboExpress, which granted it a large game library from day one. In May 1991, SEGA released its full-color competitor, the SEGA Game Gear. It had a similar architecture to SEGA's previous home console, the SEGA Master System, which allowed for quick ports and thus a large quantity of software. The marketplace was getting crowded, competition was fierce, and Atari was simply outgunned by bigger players with bigger budgets.

In July 1991, an improved Lynx II model was introduced. The second model offered a more compact design with rubber grips, introduced stereo sound, and featured a higher-quality screen and improved battery life. Furthermore, the price was reduced to only $99, sans accessories. Despite these positive moves, it was too little, too late, and Nintendo's Game Boy continued to dominate the marketplace. Still, Atari held its own until 1996, when the Lynx was ultimately retired.

Michael Thomasson

See also: Atari

Further Reading

"Come Lynx with Me." *Diary of an Atari Lynx Developer*, May 31, 2011. Available at https://atarilynxdeveloper.wordpress.com/2011/05/31/come-lynx-with-me/.

Monopoli, Paul. "The Portable Wars: Atari Lynx vs Nintendo Game Boy vs Sega Game Gear." *Paleotronic*, June 19, 2018. Available at https://paleotronic.com/2018/06/19/the-portable-wars-atari-lynx-vs-nintendo-game-boy-vs-sega-game-gear/.

Parish, Jeremy. "Too Powerful for Its Own Good, Atari's Lynx Remains a Favorite

25 Years Later." USG, July 4, 2014. Available at https://www.usgamer.net/articles/too-good-for-its-day-ataris-lynx-remains-a-fan-favorite-25-years-later.

Atari 7800 ProSystem

Atari's third cartridge-based console was the Atari 7800 ProSystem, released in 1986. It was developed to replace the failed Atari 5200 console and to revive Atari's popularity from the glory days of the Atari VCS 2600. Although the console was almost identical region to region, the European model came packaged with joypad-style controllers in place of the traditional joystick controllers seen elsewhere.

The Atari 7800 ProSystem was known during development as the Atari 3600 and later the Atari CX-9000 Video Computer System. Atari's marketing division later renamed the unit the Atari 7800. The name was derived from the fact that it was fully backward compatible with the Atari 2600 model and had Atari 5200–quality graphics. The sum of those two numbers equals 7800, and "ProSystem" was used to imply that the unit was compatible with Atari ProLine accessories. The physical housing for the Atari 7800 was actually an altered case used for the Japanese Atari 2600, the Atari 2800.

The Atari 7800 was also the first Atari product not developed internally. General Computer Corporation (GCC), an arcade coin-op game manufacturer, actually designed the console for Atari. As a result, the system featured many arcade coin-op-like qualities, such as the ability to move a large number of sprites on-screen simultaneously and a 256-color palette. The custom-made graphics chip, known as Maria, could display more graphic sprites and colors than any game system that preceded it (Forster 2005).

The system had also been designed to be fully upgradeable to a functional home computer, complete with options for a keyboard, disk drive, and printer. The original batch of 7800 consoles featured a port for future expansion with other devices, including a laserdisc player. This port was removed from the unit as a cost-cutting measure following the debut launch.

The system was set to release in 1984 but was shelved when the financially troubled Warner Communications sold off Atari, Inc. Due to the crash of 1983, the home video game market was in a state of collapse, and the home computer field was beginning to take hold and looked to become the future.

Jack Tramiel, the founder of Commodore Computers, who had been encouraged to leave his own company due to internal disagreements, bought Atari from Warner to exact revenge. The former Atari computer rival then began selling Atari brand computers to try and take market share from Commodore. Atari projects that were not associated with the computer line were abandoned to wither and die on the vine. This included the Atari 7800 console and most of the ProLine accessories, such as the much-anticipated battery-backed RAM "Hi-Score" cartridge.

In 1986, when the Atari line of computers was struggling, Nintendo released its popular Nintendo Entertainment System (NES) nationwide in North America to much fanfare (after a successful release in New York in October 1985). Taking note, the Tramiel family–governed Atari resurrected the Warner Atari 7800 project and finally released it in 1986 for the value price of only $140. Two years beyond its original debut date, what was once cutting-edge technology was old hat when released several years later. The console was initially meant to compete against the ColecoVision, but because of the lengthy delay in reaching store shelves, it found itself primarily competing with the NES and the SEGA Master System. To a lesser extent, it even found itself contending with Atari's own Atari XE in 1987.

Tramiel's half-hearted approach to promoting and caring for the Atari 7800 brand contributed to the system's poor showing. With little support from Atari, third parties, or consumers, the 7800 never reached its full potential. Most of the ProLine accessories were canceled, and just under five dozen 7800 titles made it to store shelves. Atari officially retired the Atari 7800 on the first day of 1992.

Michael Thomasson

See also: Atari

Further Reading

Forster, Winnie. *The Encyclopedia of Game Machines*. Utting, Germany: Gameplan, 2005.

Vendel, Curt, and Marty Goldberg. *Atari Inc.: Business Is Fun*. Carmel, NY: Syzygy Company Press, 2012.

Atari 2600. *See* Atari VCS 2600

Atari VCS 2600

The Atari Video Computer System, or VCS, was the first wildly popular video game console. Available from 1977 through 1991, the VCS holds the record for being the longest commercially available video game console. The VCS was designed in early 1976 as a replacement for Atari's line of dedicated consoles because consumers were more apt to purchase additional games for one programmable system as opposed to buying multiple dedicated systems.

The VCS was simplicity itself because the software did most of the work. The heart of the system, which contained 128 bytes of internal RAM, was a 6507 processor that ran at a mere 1 MHz. The console had been designed to play games like *PONG* and *Tank!* games that only required 2 KB of code. However, the designers built the VCS so that it could play games that had up to 4 KB of code, although they never expected programs to get that large.

Atari released the $199 VCS in October 1977. The console was sold with paddle and joystick controllers as well as a *Combat* cartridge that featured several variations of Atari's hit arcade game *Tank!* (1974) along with biplane and jet plane games. Eight additional cartridges were optionally available, including home versions of popular Atari arcade games such as *PONG* (1972) and *Surround*

(1978).

At first the VCS did not sell in quantities needed to sustain it. Even after releasing a VCS version of the arcade hit *Breakout* (1976) in 1978, along with *Codebreaker* and *Hunt & Score*, a pair of games that incorporated keyboard controllers, the console did not stir much interest. Instead, it was the importation of a new arcade game that sealed the VCS's fate. In 1978, *Space Invaders* invaded arcades around the world. Atari executives quickly realized that having *Space Invaders* available on the VCS would be a major marketing coup. In a move without precedent, Atari licensed the home rights for *Space Invaders* and released a VCS version in January 1980. Suddenly everyone had to own a VCS just so they could play *Space Invaders* at home. Atari grossed $415 million that year—more than twice that of the previous year. Atari soon licensed other arcade hits, such as *Defender* (1980) and *Berserk* (1980), and began releasing more VCS versions of its own arcade titles, such as *Missile Command* (1980).

The 4-KB limit was challenged when Atari gave Tod Frye the task of designing a VCS adaptation of Atari's arcade hit *Asteroids* (1979). Frye realized early on that he could not create a faithful rendition of the game within the confines of the allotted 4 KB. He opted to use bank switching, a method that tricked the VCS into processing games that contained more than 4 KB of code.

Bank switching involved dividing memory into disjointed sections, or banks. Although all the banks were available to the program, only one could be accessed at a time. In the case of the VCS, an instruction within the first 4-KB bank branched to an address in the second 4-KB bank, where processing continued. The branch to the second bank of 4 KB was transparent to the CPU. In effect, this allowed the VCS to process games that were larger than 4 KB. Before long, 8-KB and even 16-KB games became the norm for the VCS.

Ultimately, Atari programmers became resentful that their creations earned Atari hundreds of millions of dollars while they were treated as mere employees who were not even entitled to royalties. In addition, Atari kept its designers anonymous, fearing that competitors might lure them away. One programmer, Warren Robinett, did something about the anonymity. Robinett programmed undocumented moves into his game *Adventure* (1979), which caused his name to flash on the screen. When a twelve-year-old Utah boy found the hidden name, it was too late for Atari to correct the code.

Four other Atari programmers were not satisfied with hiding their names in games. David Crane, Ed Miller, Bob Whitehead, and Larry Kaplan teamed up with an ex-record company executive named Jim Levy and formed Activision, the first company to develop third-party software for video game consoles, specifically the VCS. Activision games featured innovative graphics and were generally considered fun to play. The name and photo of the game's designer were displayed on the instruction manual. Before long, Activision's programmers had the notoriety of rock stars.

Activision's success led to the formation of many other third-party software developers. Even companies like Quaker Oats entered the software arena, an area that they had no expertise or business being in. By 1983, there were more than three dozen companies offering software for the VCS (renamed the 2600, after its model number). Hundreds of games were available, but most of them were poorly designed and offered little play value. Even Atari managed to release inferior games. Consumers purchased its 2600 rendition of *Pac-Man* (1980; Atari 2600 version, 1981), although the game bore little resemblance to the arcade megahit that it derived from. Atari was so certain that its 2600 games would sell in droves that it produced more copies of *E.T.: The Extra-Terrestrial* (1982) than there were 2600s.

The 2600's popularity inevitably made it a magnet for add-on peripherals. The year 1983 introduced the CVC Gameline Master Module, a modem that plugged into the cartridge slot and was an early instance of a downloaded video game. Starpath's Supercharger also plugged into the cartridge slot but had games loaded into it from inexpensive cassette tapes. Amiga's Joyboard was a stand-on controller that was sold with a skiing game, *Mogul Maniac* (1983). Several companies, including Atari, planned computer upgrades for the 2600, but the video game crash of 1983 ended those plans.

In 1984, Atari was sold to Jack Tramiel, who had no interest in selling video games. However, in 1986, following Nintendo's success with the Nintendo Entertainment System (NES), Atari released the $50 2600jr, a newly designed unit much smaller than the standard 2600. Atari claimed the console was targeted for lower-income households, as an alternative to the newer higher-priced systems. The 2600jr was packaged with only a single joystick and one game cartridge. New software was also developed, but Atari could not lure customers away from the NES. In 1988, Atari began selling the games by direct mail only. It finally ceased manufacturing the 2600 in 1991, but the news hardly made headlines.

Since then, Atari 2600 games from Atari, Activision, and Imagic have appeared in their original state for play on home computers, current game consoles, and handheld game systems. The games have also been included in devices that plug directly into television sets. Atari released its own unit in 2004, called the Flashback, a direct-to-video console that resembled the Atari 7800 and had twenty games from the 1980s built-in. A year later, Atari went full circle when it released the Flashback 2, a device that resembled the original VCS from 1977. This unit had forty built-in 2600 games, including several homebrews, and came complete with joystick controllers that looked like the originals from 1977. And although it was not advertised, the Flashback 2 also accepted the original game cartridges, although one had to be knowledgeable in electronics to access the hidden cartridge port. Atari sold nearly one million Flashback 2 units, proving that the interest in the 2600 had not abated.

In 2011, AtGames, a Taiwanese electronic company, began manufacturing and marketing subsequent Flashback models under license from Atari. Updated versions have been released nearly every year since. The latest version, the Flashback 9, includes 110 built-in games in its basic model and a deluxe unit with 120 built-in games and wireless controllers. In 2016, AtGames released, for the first time, a portable unit that played Atari 2600 games. The Atari Flashback Portable featured 60 built-in games, but this library could be expanded with the insertion of an SD card that had game ROMs stored on them. In 2018, Hyperkin released the Retron 7, a small wood-grained style console that accepted Atari 2600 cartridges and displayed them in high definition on a modern TV.

AtGames also made Atari 2600 games available for play on modern consoles in 2016. Two volumes of Atari Flashback Classics, each featuring fifty Atari 2600 games (and a few arcade games), were released for both the Xbox One and the

PS4. A third volume came out at the end of 2018 for both consoles. A version that contained the games from all three of the prior volumes was released for the Nintendo Switch simultaneously.

While the old games are still being played on new systems, new homebrew games are still being developed and sold for the original system by hobbyists just for the challenge of it. In July 2010, Ed Fries, a former head of Microsoft Game Studios, designed *Halo 2600*, which was released at the Classic Gaming Expo. This 2600 approach to the classic Microsoft Xbox game continues to prove that there is continuing life in the decades-old system.

In 2017, Atari announced a new console, dubbed the Ataribox. The system was officially named the AtariVCS in homage to the original console.

Leonard Herman

See also: Atari

Further Reading

Donovan, Tristan. *Replay: The History of Video Games*. East Sussex, UK: Yellow Ant Media, 2010.

Herman, Leonard. *Phoenix IV: The History of the Videogame Industry*. Springfield, NJ: Rolenta Press, 2016.

Kent, Steven L. *The Ultimate History of Video Games: From Pong to Pokémon and Beyond*. Roseville, CA: Prima, 2001.

Lendino, Jamie. *Adventure: The Atari 2600 at the Dawn of Console Gaming*. New York: Ziff Davis, 2018.

Vendel, Curt, and Marty Goldberg. *Atari Inc.: Business Is Fun*. Carmel, NY: Syzygy Company Press, 2012.

Atari Video Computer System. *See* Atari VCS 2600

Audio (Dynamic, Interactive, and Adaptive)

Video game sound can be broadly separated into dynamic and nondynamic sound, with nondynamic sound referring to those sounds that are fixed and linear, as is the case in cinematic sequences in games, with which the player has no direct interaction. *Dynamic audio*, on the other hand, refers to the fact that, like the game itself, the audio is constantly changing in response to game parameters and the player. Dynamic audio can be separated into interactive and adaptive audio.

Interactive audio refers to sound events directly triggered by the player and therefore affected by the player's input device (controller, joystick, and so on). The player's input actions nearly always affect the soundscape of a game in an interactive fashion, from adding simple footsteps when the player moves a character on-screen, to shooting sounds upon pressing a fire button, to triggering cross-fades based on the player's directional choices. For instance, if a player runs toward an enemy in a game while firing a weapon, the shots, footsteps, and other sound effects may all be triggered directly by the player and are directly influenced by the timing of the player's input. Players may also encounter a trigger point in the visual space of the game, whereby through their character's movement on-screen, they may change the music or ambient cues from one of relative peace to an enemy cue or from one specific location to another (e.g., land to water). The player can typically run back and forth across the trigger point, retriggering the cue. Players therefore have control over these sound events in the game in terms of the timing of their playback, although the game engine usually controls the rules for playback (i.e., which sounds are associated with which events).

Adaptive audio events, on the other hand, are unaffected by the player's direct actions, although they are inevitably influenced by the indirect actions of the player. Adaptive audio events are system generated and cued by the game's engine on the basis of in-game parameters and are therefore rarely immediately repeatable. These parameters may include the general locations (as in place, e.g., "the city") or time of day (e.g., "night," based on system clocks), scripted or unscripted events (e.g., the player may need to gather certain objects before a particular character will react in a specific way), difficulty level, timing, player properties (e.g., skills, health, endurance), camera angle, and so on. An example of adaptive audio is a change in music, ambience, and sound effects as the timer in a game engine switches the scene from daytime to nighttime based on the system clock. In the Nintendo game *The Legend of Zelda: Phantom Compass* (2006), for instance, there are pieces of mail (with associated audio cues) that only arrive after a day has passed on the system's date calendar. Although the player may exit the game, change the Nintendo DS calendar, and then reload the game to force these changes, these changes are intended as indirect (adaptive) actions. Like interactive audio events, these adaptive audio sound events are also generated in runtime by the game's scripts, but the actual timing of these events can be set by timers to execute at variable timings.

Apart from cutscenes, which are fixed in a linear fashion, these degrees of dynamic activity in a game are sometimes fluid. For instance, in the Kokiri Forest from the adventure game *The Legend of Zelda: Ocarina of Time* (1998), during the first portion of the game, the player is continuously in daytime mode as he or she gets trained in gameplay, and the Kokiri Forest theme playing throughout does not change except at those points when the player enters a building or encounters an enemy. Although interactive, it is not adaptive at this point. After completing the first major task and arriving at the next portion of the game (there are no distinct levels in this game), the player then experiences the passing of time and can return to the forest. Now, if the player returns at night, the music has faded out to silence. At dawn, it will return to the main theme: the theme has now become adaptive. In other words, a cue that is interactive or adaptive at one point in the game does not necessarily remain so throughout the entire game. Moreover, there is an inherent interactivity in much of adaptive audio because there is an implied action that the sound may attempt to instigate (e.g., "Time is running out—hurry up!").

The use of interactive and adaptive audio highlights the function of much game sound as feedback-driven (or feedforward). The sound can serve informational purposes, such as “you have taken an action” (feedback—such as a jumping sound when the player presses a button), “you need to take an action” (feedforward—such as an enemy is approaching; pull out your sword), “you are taking an action” (status information, such as invincibility modes), and “you are here” (navigation information regarding where the player is, either in the game matrix or [virtual] three-dimensional space, as well as contextual and intertextual information).

Moreover, the nature of interactivity as a series of often repetitive tasks (e.g., pushing a button many times) has meant that interactive audio has struggled with heavy repetition, meaning that the sounds can become annoying or boring over time. This has spurred game sound designers to incorporate variable playback into interactive audio systems so that a sound may be selected from a series of options or even synthesized in real time.

Karen Collins

See also: Sound; Sound Technology

Further Reading

Collins, Karen. *Game Sound: An Introduction to the History, Theory and Practice of Video Game Music and Sound Design*. Cambridge, MA: MIT Press, 2008.

Fay, Todd M., Scott Selfon, and Todor J. Fay. *DirectX 9 Audio Exposed: Interactive Audio Development*. Plano, TX: Wordware Publishing, 2004.

Sweet, Michael. “Using Audio as a Game Feedback Device.” In *Game Design Workshop: Designing, Prototyping, and Playtesting Games*, edited by Tracy Fullerton, Christopher Swain, and Steven Hoffman, 307–310. Burlington, MA: CMP Books, 2004.

Augmented Reality (AR)

Unlike virtual reality (VR), which replaces what a person sees with computer-generated imagery, augmented reality (AR) overlays data and graphics over a live or mediated view of the physical world, combining the physical and virtual within the same user viewpoint. The data displayed is usually interactively connected with the view of the physical world so that it tracks it and reacts to it automatically in real time, changing as it changes, relating physical spaces and virtual spaces to each other. Applied to video games, AR can connect the world of the video game with the physical world as if one were overlaid over the other. Such games can make use of mobile computing technology, global positioning satellite tracking systems, cameras, projectors, and other recognition technology to combine game space and physical space.

Perhaps the simplest and most common type of game to use AR involves pointing a camera and a projector at the same space. The camera, coupled with a motion detector, finds the outlines of people moving in front of the screen and projects them onto the screen, along with computer-controlled characters or events that allow the audience to interact in real time with what appears on the screen. Other technologies include head-mounted displays that allow the user to see the physical world while also overlaying it with computer graphics. Julian Oliver's *levelHead* (2007) combines computer-generated imagery with live-action video imagery in real time, resulting in cubes the player manipulates that appear to have computer-generated interiors inside them. Some AR games are played on mobile gaming devices (such as an iPhone, iPod, or iPad), including A Different Game's *Ghostwire* (2008), Simbiotics' *Sky Siege* (2009), and Nintendo's *Pokémon GO* (2016), which virtually position game elements in the space around the player, who must turn around and use the mobile device as a window to see what is occurring in the game. Another game, XMG's *Pandemica* (2009), allows four players to play together, shooting at virtual aliens positioned around them. *Zombies, Run!* (2012) is a fitness app that combines running and gameplay. Ogmento, a company started in 2009, is devoted exclusively to the production of AR games.

As pattern recognition and motion detection software grow more sophisticated, AR games will become more available, and new game systems with built-in cameras or peripherals, such as the Nintendo DSi, the PlayStation Move, and Kinect for the Microsoft Xbox 360, now allow for home video games to use AR technology.

AR games are now also gaining ground on mobile devices; the screen is used as a window to view reality overlaid by a game's virtual properties. Perhaps the best-known example is Niantic's *Pokémon GO* (2016), which overlaid Pokémon characters into the real world, making them appear to be in the three-dimensional spaces where the mobile device's camera was pointing. The game was controversial due to players becoming public nuisances as they attempted to find and catch characters in public locations and also due to accidents, injuries, and even deaths caused by carelessness on the part of players. After complaints, Niantic also removed its content from sensitive locations, such as the Holocaust Museum and Hiroshima Memorial.

The hit augmented-reality mobile game app *Pokémon GO,* showing a Pokémon encounter overlain on the real world of California, on July 23, 2016. With *Pokémon GO,* players hike around cities looking for catchable monsters, or "Pokémon," on their smart phones. (Lee Chee Keong/Dreamstime.com)

Despite technical obstacles and challenges, AR continues to develop and find new uses, many of which are outside of games. The technology is still only in its infancy and appears to have multiple future directions that are already being explored.

Mark J. P. Wolf

See also: Mixed Reality; Pervasive Games; Virtual Reality

Further Reading

Aukstakalnis, Steve. *Practical Augmented Reality: A Guide to the Technologies, Applications, and Human Factors for AR and VR*. Boston, MA: Addison-Wesley, 2016.

Kim, Ryan. "Video Games Go a Step Further: Augmented Reality Is the Latest Trend." *San Francisco Chronicle,* March 13, 2010. Available at http://www.chron.com/disp/story.mpl/business/6911460.html.

Ogmento website. Available at http://ogmento.com (site discontinued).

Saint, Nick. "$3.5 Million Says Augmented Reality Video Games Have Arrived." *Business Insider,* May 26, 2010. Available at https://www.businessinsider.com/35-million-says-augmented-reality-video-games-have-arrived-2010-5.

Australia

According to Brand (2007), 79 percent of Australian households have a device to play video games. The average age of the Australian gamer is twenty-eight years old, and 41 percent of gamers are female. Video gaming is widely regarded to be a social activity, particularly within families, with two-thirds of those surveyed living in households with other game players; 56 percent of players usually played with others in the same room, and 28 percent played with others online. In 2006, the Australian games market was worth AUD 925 million, and Australians purchased almost 12.5 million units of game software that year.

The most recent in-depth analysis of the Australian video games industry (Insight Economics 2006) states that it earns AUD 110 million per annum and employs more than thirteen hundred permanent staff across more than forty game studios (Hill 2006). At this time, the majority (46%) of the Australian video game industry was based in Melbourne. The industry is well established but not immune to the global financial climate. The precarious existence of the local industry is exemplified by the financial difficulties faced by the prominent independent companies Auran Development (the developers of the *Trainz* series) in 2007 and Krome Studios (the developers of *Ty the Tasmanian Tyger* series) in 2010, which forced them to cut a considerable number of staff, and the closure of the Australian office of the multinational developers Pandemic Studios (where *Mercenaries 2: Playground of Destruction* [2008] was developed) in 2009, approximately two years after their purchase by Electronic Arts (EA). Furthermore, the development of games based on original intellectual property (IP) in Australia is uncommon; although 85 percent of the companies in Australia do develop their own IP (Insight Economics 2006), 90 percent of the industry's output is based on licensed products (Hill 2006).

The Australian market has also struggled with the regulation of video games. The key problem has been the lack of adult ratings for video games, the highest possible rating allowed being MA15+ (Mature Accompanied), meaning many games rated R (Restricted) in the United States cannot be released without changes on the Australian market. Key examples are Valve's *Left 4 Dead 2* (2009), which was only released in a cut version; Rockstar North's *Manhunt* (2003), which was withdrawn from the market completely; and Rockstar North's *Grand Theft Auto: San Andreas* (2004), which was briefly taken off the shelves in the wake of the "Hot Coffee" scandal. Bethesda Studios declared a global delay on the release of *Fallout 3* (2008) while they resolved issues that would prevent the game's uncut release in Australia. The game was accepted for distribution and sale after all references to the drug morphine were removed. Although this issue has become contentious in local and national government, in 2012, it appeared likely that the system would be reformed in the near future.

Thomas H. Apperley

See also: New Zealand

Further Reading

Apperley, Tom. “Video Games in Australia.” In *The Video Game Explosion: A History from PONG to PlayStation and Beyond*, edited by Mark J. P. Wolf, 223–228. Westport, CT: Greenwood Press, 2007.

Banks, John. “Co-Creative Expertise: Auran Games and Fury—A Case Study.” *Media International Australia: Incorporating Culture and Policy* 130 (2009): 77–89.

Brand, J. E. *Interactive Australia 2007: Facts about the Australian Video Game Industry*. Eveleigh, Australia: Interactive Entertainment Association of Australia, 2007. Available at https://www.semanticscholar.org/paper/Interactive-Australia-2007-%3A-facts-about-the-and-Brand/bb996b1cf2922231f61d294977b47d2e9caf41bb.

Hill, J. “Game Industry at the Crossroads.” *The Age*, September 7, 2006. Available at http://www.theage.com.au/news/games/game-industry-at-the-crossroads/2006/09/06/1157222139337.html?page=fullpage.

Insight Economics. “Australian Electronic Game Industry Profile.” 2006. Available at https://gamesindustryskills.files.wordpress.com/2010/06/gdaa_industry_profile_report_221106.pdf.

Avatars

The word *avatar* comes from the Sanskrit word *Avatãra*, meaning “descent,” referring specifically to the descent of a deity in human, superhuman, or animal form into the mortal realm. It is traditionally used in Hinduism to refer to the bodily incarnation of a heavenly soul (deity or god) on earth. Early appropriations of the word *avatar* in digital culture can be found in various forms, including in Origin Systems’ *Ultima IV: Quest of the Avatar* (1985), Lucasfilm Games’ online virtual world *Habitat* (1986), and Neal Stephenson’s science fiction novel *Snow Crash* (1992).

The word *avatar* in contemporary digital culture refers to a digital character controlled by the player or user within a digitally mediated environment. In online spaces such as chat rooms, message boards, discussion forums, and social networking sites, avatars are often two-dimensional images that are coupled with the user’s online name or pseudonym that are used to represent the user. Depending on the site, users may select an image from a database or upload their own photos.

In a video game, an avatar is a two- or three-dimensional visual representation bearing the aesthetic style found within the context of each particular game world. An avatar is also sometimes synonymous with the term *player character* (PC), which literally means the character that the player plays, or controls, within the video game world. Although the word *avatar* can sometimes be extended to mean all the characters within a game world that are not playable by the player, these are more often referred to as *non-player characters* (NPCs).

The degree to which a player can customize an avatar varies depending on the specific video game title and genre. Some video games, such as those of *The Sims* series, allow players almost full creative freedom to create their avatars by selecting from a wide range of characteristics, such as gender, hair color and style, eye color and shape, body type, clothing, personality traits, and career trajectory. In massively multiplayer online role-playing games (MMORPGs), such as *EverQuest* (1999) and *World of Warcraft* (*WoW* [2004]), players have a more limited range of freedom to create their avatars before beginning the game. Players must first select a gender, race, and class as well as other aesthetic characteristics, like *The Sims* series of games. Players may further customize their avatars during gameplay as they work toward leveling their characters and new armor and trinkets are acquired and adorned; players may dye the color of their armor, and hairstyles can be changed in the game. With the constant development of technology, avatars are becoming increasingly customizable, further increasing the potential for player identification with the avatar on the screen.

However, many video games offer the player minimal to no customization options, depending on the genre and title. In some games, the player's only choice is to play either a preexisting male or female character, although a game's narrative may change depending on the gender of the avatar the player opts to play. Single-player games often have more rigid boundaries regarding character creation and development, generally because of a more structured narrative and controlled path of gameplay.

It has been widely claimed that avatars have the potential to influence player identity, in both positive and negative ways, through avatar design, customization, and gameplay (Apperley and Clemens 2017; Cassell and Jenkins 2000; Kolko 1999; Merola and Peña 2010; Nakamura 2002; Waggoner 2009). Regardless of avatar customization levels in single-player (Jenson et al. 2015) and multiplayer games (Jenson et al. 2015), avatars are often connected to player identification and engagement within digital games.

Kelly Boudreau

See also: Non-Player Characters

Further Reading

Apperley, Thomas H., and Justin Clemens. "Flipping Out: Avatars and Identity." In *Boundaries of Self and Reality Online: Implications of Digitally Constructed Realities*, edited by Jayne Gackenbach and Johnathan Bown, 41–56. Cambridge, MA: Academic Press, 2017.

Banks, Jaime. "Object, Me, Symbiote, Other: A Social Typology of Player-Avatar Relationships." *First Monday* 20, no. 2 (2015). https://doi.org/10.5210/fm.v20i2.5433.

Cassell, J., and Henry Jenkins, eds. *From Barbie to Mortal Kombat: Gender and Computer Games*. Boston, MA: MIT Press, 2000.

Hamilton, J. G. "Identifying with an Avatar: A Multidisciplinary Perspective." *Proceedings of the Cumulus Conference: 38º South: Hemispheric Shifts across Learning, Teaching and Research,* Swinburne University of Technology and RMIT University, Melbourne, Australia, November 12–14, 2009.

Jenson, Jennifer, Nicholas Taylor, Suzanne de Castell, and Barry Dilouya. "Playing with Our Selves: Multiplicity and Identity in Online Gaming." *Feminist Media Studies* 15, no. 5 (2015): 860–879.

Klevjer, Rune. *What Is the Avatar?: Fiction and Embodiment in Avatar-Based Single-Player Computer Games*. Unpublished doctoral dissertation, University of Bergen, 2006. Available at http://folk.uib.no/smkrk/docs/RuneKlevjer_What%20is%20the%20Avatar_finalprint.pdf.

Kolko, B. E. "Representing Bodies in Virtual Space: The Rhetoric of Avatar Design." *Information Society: Special Issue: The Rhetorics of Gender in Computer-Mediated Communication* 15, no. 3 (1999): 177–186.

McArthur, Victoria. "Making Our Friends Visible: Challenging the User-Avatar Dichotomy in Avatar Customization Research." *Eludamos. Journal for Computer Game Culture* 9, no. 1 (2018): 75–95.

Merola, N., and J. Peña. "The Effects of Avatar Appearance in Virtual Worlds." *Journal of Virtual Worlds Research* 2, no. 5 (2010). Available at http://journals.tdl.org/jvwr/article/view/843/706.

Nakamura, L. *Cybertypes: Race, Ethnicity, and Identity on the Internet*. New York: Routledge, 2002.

Waggoner, Z. *My Avatar, My Self: Identity in Video Role-Playing Games*. Jefferson, NC: McFarland, 2009.

AY-3-8500 Chip

Although integrated circuits (IC) were around in 1968, the Brown Box, the prototype for the first video game console, the Magnavox Odyssey, was built using discrete components, such as transistors, resistors, and capacitors. This was primarily done because the price of ICs at that time was cost-prohibitive. But another reason Ralph Baer used discrete components was because the televisions that the units would be hooked up to also used the same parts. While the Odyssey was built using the components in its prototype, by the time it was released in 1972, the cost of ICs had dropped significantly.

In 1975, when Magnavox released its second generation of video game consoles, it turned to chipmaker Texas Instruments (TI). TI designed two custom chips that simulated the gameplay from the original Odyssey. These chips were used in the Odyssey 100 and the Odyssey 200 and were designed exclusively for Magnavox.

During the same year, Atari released its first home console, *PONG* (popularly referred to as *Home PONG*). Atari's engineers designed their own custom chip for the unit; so, like the TI chip, it was not available for other companies to use. So any company that wanted to jump onto the enticing video game bandwagon had to potentially design its own system from scratch.

That changed when General Instruments (GI) introduced its AY-3-8500 chip in early 1975, which had been designed specifically for the consumer market. General Instruments did not plan to market its own video game console. Instead, the chips, which were designed by Duncan Harrower, an engineer with GI in Glenrothes, Scotland, were designed so third-party companies could purchase them and build their own consoles around them. The AY-3-8500 was perfect for fledgling companies that wanted to enter the lucrative video game market because it featured six games: two-player tennis, two-player soccer, two-player squash, a one-player target game, and a one- and two-player target game that required a light gun.

In addition to various games, several game options were also built into the chip. Among them was *English*, which put a spin on the returning ball. The original Odyssey included English, and Ralph Baer called it the console's "secret weapon" because few players knew about it or what it did. Other options that were built into the chip were ball speeds and angles and the size of the players' paddles.

In March 1975, the inventor of the video game console, Ralph Baer, was invited to GI's Long Island factory and immediately saw the chip's potential. Since Baer's employer, Sanders Associates, collected a licensing fee for every console sold, Baer saw a large revenue stream, as this meant that companies that had no familiarity with the development of video game consoles could now easily enter the marketplace.

Because Baer had been upset with the way Magnavox had been handling marketing of the Odyssey and its sequels, he contacted Arnold Greenberg, the president of the Hartford, Connecticut, toy company Coleco. He convinced Greenberg to come see the chip and to enter the video game market as quickly as possible. After seeing the AY-3-8500-1 chip, Greenberg placed a large order with GI, and Coleco designed a system around it called the Telstar. The system was released in mid-1976 and retailed for only $50, which was not bad since the AY-3-8500 chip inside it cost only $5. Coleco sold over one million units that year.

Coleco nearly had a monopoly on the video game market. As GI had hoped, a multitude of manufacturers sought to purchase the chip to sell their own gaming consoles. Because of this, GI underestimated the number of chips that it needed to fulfill the demand by 60 percent. Thanks to Ralph Baer, Coleco was the first company to place an order with GI, so it received its entire order. No other company received a complete order, with many only receiving 20 percent of what they had requested.

The Coleco Telstar played only three of the games that were on the chip: *Tennis*, *Hockey*, and *Squash* (which Coleco renamed *Handball*). However, over the following two years, Coleco released an additional eight consoles under the Telstar brand that used all the games on the chip.

GI was eventually able to produce a sufficient number of chips to satisfy all the orders. Within two years, there were hundreds of consoles from dozens of manufacturers that used the AY-3-8500 chip.

General Instruments followed the AY-3-8500 with the AY-3-8550, which played the same games as its predecessor, but its video output was in color. The following chip, the AY-3-8610, added several more games to the chip's lineup.

Leonard Herman

See also: Generations of Technology

Further Reading

Baer, Ralph. *Videogames: In the Beginning*. Springfield, NJ: Rolenta Press, 2005.

Herman, Leonard. *Phoenix IV: The History of the Videogame Industry*. Springfield, NJ: Rolenta Press, 2016.

Lockhart, Nate. “Interview with Gilbert Duncan Harrower, Inventor of the “Pong-on-a-chip.” The Geekiverse, January 25, 2019. Available at https://thegeekiverse.com/interview-with-gilbert-duncan-harrower-inventor-of-the-pong-on-a-chip.

Winter, David. PONG-Story website. Accessed September 1, 2020. Available at http://www.pong-story.com/.

B

Baer, Ralph H. (1922–14)

Sometimes described as the "Father of the Home Video Game Industry," Ralph H. Baer was an engineer and inventor who developed the first home video game console system, the Magnavox Odyssey, as well as a host of other toys and inventions in consumer electronics, for which he held more than 150 patents (including patent #3,728,480, "Television Gaming and Training Apparatus," which became the basis of the home video game industry). By conceiving of the television set as a display device that could be used for electronic games, he was responsible for bringing video games into the home and making them an affordable commercial product that could be purchased by the average consumer.

Baer was born in Germany in 1922, came to the United States with his family in 1938, and graduated from the National Radio Institute two years later. In 1943, he served in World War II, during which he was stationed in England and France. After the war, he earned a degree in the new field of television engineering in 1948. Over the next seven years, he worked as an engineer at Wappler, Inc. (1949–50), as a senior engineer at Loral Electronics (1951–52), and as chief engineer and vice president for engineering at Transitron, Inc. (1952–56). There he developed and put into production a large number of radar test equipment and radio communications systems.

In 1956, Baer came to Sanders Associates, in Nashua, New Hampshire, where he remained until his retirement from the company in 1987. Baer was a division manager who supervised up to five hundred engineers, technicians, and support people working on the development of countermeasure systems and space-related hardware, giving him the means to pursue new ideas. Baer described his situation as follows:

> Along the way I wandered off the straight and narrow into interactive video areas that initially had nothing at all to do with the normal work going on in my division at Sanders. The invention of videogames in 1966, the concept of using TV sets for something other than watching network fare, came first; building the early feasibility models came next. The activity started as a skunk works operation but it didn't stay that way for long. (Baer 2005, 3)

Baer's experiments resulted in a series of seven prototypes of which the "Brown Box" was the seventh. These prototypes were developed during part-time work involving Bill Harrison, the technician who actually built the models; Bill Rusch, who provided engineering support and ideas; and Baer, who supervised the activity. After two years, in mid-1967, Sanders applied for patents on Baer's invention. Baer's team also made overlays to be used on the TV screen and a light gun that could be used for shooting games. In 1971, a licensing agreement was signed between Sanders Associates and the television set manufacturer Magnavox, and a year later, the Brown Box technology was developed into the Magnavox Odyssey, which became an international success. A version of Baer's light gun was made for the Odyssey and became the first video game peripheral. Other video game accessories, such as a golf ball atop a joystick for playing putting games and additional accessories were developed during that period but were not pursued by Magnavox. A series of Odyssey consoles also followed, with new systems appearing every year until 1978; in the end, Magnavox had produced and sold around 1.7 million Odyssey units (Baer 2005, 133). Video game technology developed by Baer was also licensed to other companies in the industry, and over the years, the money brought in from those licenses and from lawsuits against patent infringers alone amounted to more than $100 million (roughly four times as much in 2010 dollars) for Magnavox, Sanders, and their lawyers (Baer 2005, 88).

Starting in 1975, Baer began to devote his time and talents to electronic toys and games other than video games. Along with Howard J. Morrison, he developed Milton Bradley's *Simon* game (1978), one of the most popular electronic games of the late 1970s and 1980s; it is still in current production, although in a much-advanced form. Baer also introduced the management of Coleco to the possibilities of developing low-cost video game consoles based on General Instruments' AY-3-8500 single-chip game system, which powered millions of low-end console games in the period from 1975 through 1978, both in the United States and overseas. The result was Coleco's Telstar system in 1976, and Baer also participated in the development of subsequent models in the Telstar line, including the Telstar Arcade of 1977, the first home system to feature a built-in steering wheel controller. Other inventions that Baer worked on for Coleco included a TV Alarm Clock and a TV Weather Station, both of which involved displaying numbers and text on-screen, superimposed over a broadcast television signal. He also worked on ways to use audiotape players with video games to give them better sound quality and a video game system that could control a videodisc player, which also led to Interactive Video Training Systems for the military. In 1985, Baer worked with Bally/Midway, who licensed Baer's invention, which involved a video camera built into an arcade game that allowed the player's face to be digitized, stored, and used in the game on the head of a game character.

After his retirement from Sanders in 1987, Baer remained active in the video game and interactive video fields through his own business, R. H. Baer Consultants. In 2000, along with his longtime friend and colleague Bob Pelovitz, Baer licensed Hasbro/Tonka to produce the *Talkin' Tools* series of toys using his technology. Baer donated his technical papers to the Smithsonian Institution and also replicated several of the early game systems from 1966 through 1969 for museum displays. In his book *Videogames: In the Beginning* (2005), Baer recounts his experiences and inventions, supplementing his text with numerous scans of documents, schematics, and product photographs and flyers.

Although he is best known for his pioneering efforts in video games, Baer's wide range of technological accomplishments spans seven decades. Some of Baer's other firsts include an audiotape player controlled by a video game (1973); real-time extraction of data from video (1974); a programmable and remotely controllable record player (1977); the ability to draw symbols on-screen interactively during video game play (1980); the first patent for video game instant replay (1981); talking greeting cards (1982); a hand puppet used as a video game controller (1983); an interactive VCR game with real-time branching to multiple screens (1984); a doll that could look at text and read it out loud (1987); a recordable talking doormat (1992); interactive, recordable talking books (1993); a talking picture frame (1996); a talking speedometer for bicycles (1998); and other toys and consumer electronics. Baer also received many awards for his pioneering work, including the National Medal of Technology in 2006, the IEEE Masaru Ibuka Consumer Electronics Award in 2008, and induction into the National Inventors Hall of Fame in 2010. In March 2012, he was the special guest at the annual meeting of the Video Game Studies SIG of the Society of Cinema and Media Studies (SCMS), where he was honored with a birthday cake in the shape of a Magnavox Odyssey, celebrating Baer's ninetieth birthday and the Odyssey's fortieth birthday. Baer died on December 6, 2014, at his home in New Hampshire.

In July 2015, Baer's actual workbench that had been removed from his New Hampshire home was set up as a permanent exhibit at the Smithsonian's National Museum of American History. Initially, the original Brown Box was part of the exhibit, but it has since been moved into storage and has been replaced by a replica. In June 2016, a similar exhibit was set up at the International Center for the History of Electronic Games at the Strong National Museum of Play, using Baer's work desk from his Florida condominium. In spring of 2019, a small brick square was installed on the Riverwalk in the Millyard along the Merrimack River in Manchester, New Hampshire, featuring a bench that has a statue of Baer sitting on it while holding a Brown Box.

Mark J. P. Wolf and Leonard Herman

See also: Idea for Home Video Games; Magnavox Odyssey

Further Reading

Baer, Ralph H. Foreword to *The Medium of the Video Game*, by Mark J. P. Wolf, ix–xvi. Austin: University of Texas Press, 2001.

Baer, Ralph H. Foreword to *Phoenix: The Fall & Rise of Videogames*, 3rd ed., edited by Leonard Herman, xiii–xiv. Springfield, NJ: Rolenta Press, 2001.

Baer, Ralph H. "Video Game History: Getting Things Straight." In *Before the Crash: Early Video Game History*, edited by Mark J. P. Wolf, 225–233. Detroit, MI: Wayne State University Press, 2012.

Baer, Ralph H. *Videogames: In the Beginning*. Springfield, NJ: Rolenta Press, 2005.

R. H. Baer Consultants website. Accessed September 6, 2020. Available at http://www.ralphbaer.com.

Ralph H. Baer Papers at the Smithsonian. Accessed September 6, 2020. Available at https://invention.si.edu/ralph-h-baer-papers?

Video Game History Timeline. Available at www.gamesanthropology.net.

Bailey, Dona (1955–)

Dona Bailey worked as a programmer at Atari and is best known for her leading role in the design of the arcade game *Centipede* (1981). Bailey started her career as a programmer at General Motors (GM), and after getting hooked on *Space Invaders* (1978), she looked to make a switch into game development and saw that Atari used the same programming language as GM. She joined Atari in 1980 and was immediately tasked with designing for coin-op arcades with little to no guidance. She grabbed a design notebook from a previous brainstorming session and was attracted to an idea that involved shooting apart a segmented bug: "It sounded the most different from the other game descriptions and was the most appealing to me" (quoted in Brathwaite 2007). Collaborating with designer Ed Logg, Bailey created what would be Atari's second-highest selling arcade game after *Asteroids* (1979).

Centipede is first notable because it is the first video game to incorporate artificial intelligence (AI) and, second, because of the implementation of a trackball as a control interface. Central to the AI is the ability of the centipede to create two independent heads when a centipede is shot in the middle and split in half. While the giant arthropod slowly hunts the player down the screen, other threats fall from the sky, taking aim at the player.

Like much early arcade game development, hardware and software often coevolved in response to the needs and affordances of each. *Centipede* is no exception. Bailey described her frustration with the default push-button controllers that she was provided. She reported that a software manager noticed this and, after trying the joystick, suggested that Bailey use the newly developed mini-trackball. Bailey then explained, "I instantly loved the effortless swooping and gliding that the mini-trackball offered. The mini-trackball was the right controller for me" (quoted in Porges 2017).

Bailey's user experiences influenced the game's aesthetic design as well. *Centipede* has a pastel color palette, which is partially credited with attracting more women players to the game. Even here, Bailey's own aesthetic sensibility shaped the look of *Centipede*. As she explained, a technician needed to work on the cabinet and game, and during this maintenance, Bailey watched colors cycle through and stop on vivid pastel colors. She asked the technician to stop, and those colors became central to the look of the game, deviating from the standard primary color palette of the day.

Bailey left Atari after only two years to join ex-Atari employees at Videa, a new game start-up, but this was short-lived. She switched to, and later retired from, a career in rhetoric and composition at the University of Arkansas at Little Rock. Nevertheless, she has become a touchstone in the history of women in games. When she joined Atari, there was a 1:30 female-to-male ratio. By the time that she left games, it was a 1:600 ratio. In recent movements to reclaim early game history and a history of women in games, Bailey's significant success is evidence of the positive impact of diverse voices in the design and development of a game.

Jennifer deWinter and Carly A. Kocurek

See also: Atari

Further Reading

Brathwaite, Brenda. "Q&A: How Centipede Co-Creator Bailey Got The Bug." Gamasutra.com, August 3, 2007. Available at https://www.gamasutra.com/view/news/105919/QA_How_Centipede_CoCreator_Bailey_Got_The_Bug.php.

Foxx-Gonzalez, Kellie. "Meet Dona Bailey, the Woman behind Atari's Centipede: This Exists . . . because of a Lady," TheMarySue.com, July 10, 2012. Available at https://www.themarysue.com/donna-bailey-centipede/.

Motherboard. "The Unsung Female Programmer behind Atari's Centipede." Vice Video, October 2017. Available at https://video.vice.com/en_us/video/hello-world-dona-bailey/55e0d8e8def5f894792e5d8d.

Porges, Seth. "The Happy Accidents That Led To The Arcade Classic 'Centipede'." *Forbes*, November 30, 2017. Available at https://www.forbes.com/sites/sethporges/2017/11/30/the-happy-accidents-that-led-to-the-arcade-classic-centipede/?sh=38eedf652e46.

Ball-and-Paddle Games

The genre of video games sometimes referred to as *ball-and-paddle games* are those in which a ball (usually represented by a small white square) is bounced back and forth against the player's paddle (usually represented by a white rectangle) on the side of the screen. Two of the earliest and most famous examples of ball-and-paddle games include the first home console system, the Magnavox Odyssey, and the arcade game *PONG* (1972), the first game produced by Atari.

The main importance of ball-and-paddle games to video game history is the way they introduced video games to a mass audience around the world, and, for a while, they were synonymous with the term *video games* itself. Although they were preceded by several types of mainframe games, such games were not the first to break through to a mass audience for several reasons: (1) they were more complex to play, whereas ball-and-paddle games were very simple and easy to learn; (2) they required expensive hardware and software, whereas the earliest ball-and-paddle games used much less technology and did not even require software (e.g., *PONG* was an assembly of eighty logic chips [Winter 2011]); and (3) they were patterned after the existing activity of table tennis, making the game conceptually easy to understand (which was necessary because no video game conventions had yet been established).

After the release of the Magnavox Odyssey and *PONG* in 1972, an increasing number of companies began releasing ball-and-paddle games, including licensed as well as bootleg versions of *PONG*. A variety of games developed that were all based on the concept of bouncing the ball off paddles. Some games had multiple paddles controlled by the player, arranged vertically or horizontally on the screen, and because of these different arrangements, the games were referred to as a variety of different sports, including baseball, basketball, football, hockey, soccer, volleyball, and so on, with some games bearing little or no resemblance to their physical counterparts. Some variations allowed doubles play and four players, and some had computer-controlled players. Others began to move in other directions. In *Breakout* (1976), the ball and paddle were used to destroy a wall of bricks.

The success of the earliest commercial ball-and-paddle games, and the novelty of video games in general, brought about a flood of imitators after 1973 as well as several more models and variations from Magnavox and Atari. Ball-and-paddle games were also the first to reach many countries and areas around the world, including Asia, Europe, Australia, Latin America, and the Middle East. Importation also provided a way for companies established in other areas to enter the video game market; for example, Nintendo's first video game venture was the importation of the Magnavox Odyssey into Japan in 1974.

For the 1975 release of the home version of *PONG*, engineers at Atari integrated all the circuitry necessary for the game on a single chip. Chips containing more circuitry became common after the invention of large-scale integration (LSI) chips, and their mass production by General Instruments in 1976—particularly the AY-3-8500 chip, which had all the components for a ball-and-paddle game on it—made games cheap to make. Due to the chip, dozens of companies joined the competition, flooding the market and resulting in a record-breaking year for video game sales as the industry flourished.

Another system released in 1976, the Fairchild Channel F, introduced the idea of interchangeable game cartridges, unlike the dedicated and unchangeable systems of most ball-and-paddle games. The following year, the Atari VCS 2600 would be released, and as the public realized cartridge-based systems were the future of the industry, interest in dedicated systems waned just as more companies were entering the ball-and-paddle game market, bringing about the crash of 1977. After that, consoles of the second generation of technology became dominant, and after 1978, ball-and-paddle games had died out almost entirely, leaving only old machines in arcades for some time after that. Today, ball-and-paddle games are a part of retrogaming and may appear as minigames within larger games, functioning as nostalgic artifacts that recall the birth of video games as an industry.

Mark J. P. Wolf

See also: Generations of Technology

Further Reading

Baer, Ralph H. *Videogames: In the Beginning*. Springfield, NJ: Rolenta Press, 2005.

Winter, David. "A Five-Year Craze: The Ball-and-Paddle Apogee." 2011. Unpublished manuscript.

Winter, David. PONG-Story website. Accessed September 6, 2020. Available at http://www.pong-story.com.

Bally

The Bally Manufacturing Corporation was established in Chicago in 1932 as a daughter company of Lion Manufacturing. Named after its first pinball game, *Ballyhoo*, the company produced games and amusement devices, and by the end of the decade, it had expanded into gambling equipment and vending machines. In 1963, following the financial failure of Lion Manufacturing, Bally was bought out by investors and went on to dominate the slot machine market. It introduced the world's first electromechanical slot machine in 1964. In 1969, the company acquired Midway Manufacturing, the maker of mechanical and, beginning in 1973, electronic arcade games. With a number of successful titles—including licenses to Taito's *Space Invaders* (1978) and Namco's *Galaxian* (1979), *Pac-Man* (1980), and *Galaga* (1981)—Midway was Bally's primary source of revenue throughout the 1970s and early 1980s.

In the late 1970s, the company briefly ventured into the home console business with the cartridge-based Bally Professional Arcade. First announced in 1977 (and originally named the Bally Home Library Computer), the system was not released until the following year. The hardware, designed by the Midway division, was based on Midway's arcade machines of the time, with a Zilog Z80 CPU, operating at 1.79 MHz, 4 KB of random-access memory (RAM), and 8 KB of read-only memory (ROM). The system could simultaneously display up to 8 colors from a 256-color palette, at the maximum resolution of 160-by-102 pixels, and was capable of producing four-channel sound. Retailing for $299, the Professional Arcade sold poorly, largely because of bad marketing decisions (the system was only available from computer stores) and technical problems (it was prone to overheating and malfunctions).

After Bally decided to withdraw from the consumer market, the license to the system was sold to Astrovision, who rereleased it in 1981 as the Bally Computer System and, beginning in 1982, as the Astrocade. The console was discontinued in 1984 with the company's bankruptcy following the video game industry crash of 1983.

In 1981, Bally's pinball division merged with Midway. Under the Bally/Midway name, the company developed and released such titles as *Tron* (1982), *Spy Hunter* (1983), and *Rampage* (1986). Throughout the early 1980s, Bally aggressively expanded, acquiring the Six Flags amusement park chain, the Health and Tennis Corporation of America, and a number of hotels and casinos. However, the company soon ran into financial problems and was forced to sell off a number of divisions, including Bally/Midway, which was purchased in 1988 by WMS Industries.

Following restructuring and management changes in the late 1980s and early 1990s, Bally Manufacturing split into two independent entities. Bally Entertainment Corporation, focused on the operation of fitness centers and casinos, went on to become Park Place Entertainment and then Caesar's Entertainment. In 2005, it was bought out and dissolved by Harrah's Entertainment. Bally Gaming International, a casino equipment manufacturer, merged with Alliance Gaming Corporation in 1992. In 2006, the company changed its name to Bally Technologies, Inc.

Meanwhile, Williams-Bally-Midway continued releasing arcade games under the Bally/Midway name until 1991, when Midway absorbed Williams's game development division and dropped Bally from the name. Bally brand pinball tables were manufactured until 1999, when Midway, by then an independent company, decided to leave the pinball business.

P. Konrad Budziszewski

See also: Williams (Company)

Further Reading

"Bally Manufacturing Corporation History." *Funding Universe*. Accessed September 6, 2020. Available at http://www.fundinguniverse.com/company-histories/bally-manufacturing-corporation-history/.

Marfels, Christian. *Bally: The World's Game Maker*. Las Vegas, NV: UNLV International Gaming Institute, 2001.

Battlezone

Released by Atari in November 1980, *Battlezone* was the first arcade game to use a first-person perspective with an environment produced with true three-dimensional computation. Designed and written primarily by Ed Rotberg and Morgan Hoff, *Battlezone* simulates tank combat on a barren landscape and uses the vector graphics technology developed at Atari by Howard Delman. Although previous games viewed gameplay from a third-person perspective, such as the similarly themed *Tank!* (1974) from Kee Games (a company owned by Atari) and the mainframe game *Panther* (1975), *Battlezone* provided a perspective from within the tank that the player controls. In the game, the player is pitted against other tanks as well as occasional flying saucers and guided missiles; the player may use three-dimensional stationary geometric objects for cover within the game to shield the tank from enemy fire. Both the stationary objects and enemy vehicles in the game are composed of wireframe models that depict the outlines of diegetic objects.

Like *Tank!*, *Battlezone* uses two joysticks for control of the player's tank and firing of its weapons. Original versions of *Battlezone* arcade cabinets used a periscope-like viewfinder through which the player controlled the game, much like the one employed in Midway's submarine game *Sea Wolf* (1976) or the earlier electromechanical game *Periscope* (1966) by SEGA. Although it did not appear in later versions of the game, this scope enhanced the game's first-person perspective by restricting peripheral vision and narrowing the player's vision to the game's events. The player's point-of-view was thus placed within the diegetic game world by both the first-person perspective and by the physical design of the arcade cabinet. Along with *Defender* (1980), *Battlezone* pioneered the use of a radar scope depicting off-screen space and events in diagrammatic form as an overhead view. This forced players to simultaneously consider events that were visible on-screen as well as those occurring off-screen and only reported by the radar scope (e.g., players must consider the movement of other tanks which may be maneuvering behind the player's tank), enhancing the impression of a virtual space surrounding the player.

Although the game space of *Battlezone* appears to the player to be contained by a mountainous horizon that includes an erupting volcano, player movement is not restricted to a bounded space within the three-dimensional game world (i.e., players may move in a single direction and never reach a boundary). *Battlezone* is an example of the use of vector graphics in an arcade game, most notably following the first vector-based arcade games, Vectorbeam's *Space War* (1977) and Cinematronics' *Space Wars* (1977), as well as the success of Atari's own *Asteroids* (1979). Although the game's monitor was black and white, a sectioned screen overlay tinted the graphics red at the top fifth of the screen for the radar, score, and other data, whereas the remainder of the screen, used for first-person perspective viewpoint, was tinted green.

Military consultants for the U.S. Army asked Atari to develop a military simulator based on the *Battlezone* game for the Bradley Infantry Fighting Vehicle (IFV). Although members of the development team objected, the simulator (known as *Army Battlezone* or the *Bradley Trainer*) was made, with a number of changes to *Battlezone*, including a new control yoke based on the Bradley IFV. This yoke was used in the later Atari game *Star Wars* (1983), which also features the use of vector graphics and first-person perspective.

The legacy of *Battlezone* is evident in contemporary video games, from its popularization of first-person perspective to ports of the game to a number of home systems. Activision released an updated version of *Battlezone* in 1998 for home computers that significantly expanded gameplay elements and added real-time strategy elements, and a 2008 version by Stainless Studios for Xbox Live remains closer to the original game, with added features such as multiplayer capability. Rebellion Studios released a virtual reality (VR) iteration for the PlayStation VR in 2016 and other consumer VR platforms in 2017.

Christopher Hanson

See also: Atari

Further Reading

Burnham, Van. "BattleZone." In *Supercade: A Visual History of the Videogame Age: 1971–1984*, 2016. Cambridge, MA: MIT Press, 2001.

Hague, James, and Ed Rotberg. "Ed Rotberg." In *Halcyon Days*, version 1.1, November 2018. Available at http://www.dadgum.com/halcyon/BOOK/ROTBERG.HTM.

Kent, Steven. "The Golden Age (Part I: 1979–1980)." In *The Ultimate History of Video Games: From Pong to Pokémon and Beyond*, 123–149. Roseville, CA: Prima, 2001.

Sellers, John. "BattleZone." In *Arcade Fever*, 42–43. Philadelphia, PA: Running Press, 2001.

Trachtman, Paul. "A Generation Meets Computers on the Playing Fields of Atari." *Smithsonian* 12, no. 6 (1981): 51–61.

Wolf, Mark J. P. "*BattleZone* and the Origins of First-Person Shooting Games." In *Guns, Grenades and Grunts: First-Person Shooter Games*, edited by Gerald A.

Voorhees, Josh Call, and Katie Whitlock, 25–40. New York: Continuum, 2012.

Wolf, Mark J. P. “Vector Games.” In *The Video Game Explosion: A History from PONG to PlayStation and Beyond*, edited by Mark J. P. Wolf, 67–71. Westport, CT: Greenwood Press, 2008.

BBSs. *See* Bulletin Board Systems

“Beating” a Game

Players can be said to have *beaten* a video game when they have achieved mastery over the game narratively, technically, or even on the level of the game’s source code. In contrast to *winning*, in which a player prevails over another player or non-player character in a single contest, *beating* a game implies that the player has mastered some aspect of a particular video game completely. Players may look to indicators within a game, such as points, levels, a score, or a progress bar, to see how close they are to beating a game. This “feedback system” provides motivation and the promise that the game can be beat (McGonigal 2011, 21). Goals that players often work toward to “beat” video games include completing the prescribed narrative, sometimes in the fastest possible time; collecting all of a set of objects or earning a complete set of achievements (or “100% Completion”); earning the highest level for a player character or on a player network; becoming the most respected or feared personality in a multiplayer game world; or even successfully playing *against* the fabric of the game, exploiting all of its glitches and cheats or finding other innovative ways to gain power over the game’s mechanics.

Hidden features, known as *Easter eggs*, may await players who replay a game with the goal of complete mastery over all the game’s possibilities. Mark J. P. Wolf writes of how the inclusion of these hidden choices shifts players’ focus away from the completion of an in-game objective (winning) and toward playing “to explore the game’s world and how the game functions” (Wolf 2006, 82). Alison Gazzard defines the unlocking of hidden areas in terms of “rewards of exploration” that can build upon one another, as when an unlocked item or character allows access to previously unreachable areas. Earning 100 percent in a game like *LEGO Indiana Jones* (2008) may thus involve many cycles of beating the same level with different characters (Gazzard 2011).

Paul Budra characterizes the first-person shooting game as having particularly “obvious and urgent” goals compared with other game genres. He describes the linearity and narrative reward structure of such games as *Wolfenstein 3D* (1992) and *DOOM* (1993) as linking the action of shooting with the production of meaning and writes, “Ideological coherence emerges from digital carnage. The player kills to gain knowledge and, more importantly, certainty, a most rare and precious commodity in the postmodern world” (Budra 2004, 4–10).

“BEATING” THE COMPUTER

Some players use the phrase "beating the game" in reference to reaching the end of a game's technical capacities. In the case of arcade games designed to be never-ending, such as *Pac-Man* (1980) or *Donkey Kong* (1981), extremely skilled gamers can sometimes reach a "kill screen" where the game's programming fails and the game glitches or crashes to such an extent that further gameplay is impossible.

In narrative games, exhausting the game's capacities is often simultaneous with the completion of a narrative. Marie-Laure Ryan makes a distinction between narrative games and playable stories, writing that "in a narrative game, the player plays to win, to beat the game, and story is mostly a lure into the game world. . . . In a playable story there is no winning or losing: the purpose of the player is not to beat the game, but to observe the evolution of the storyworld" (Ryan 2009, 46). Quantic Dream's *Heavy Rain* (2010) offers different endings depending on the player's actions within the game. Although no single ending constitutes beating *Heavy Rain*, the game gives achievements to players who experience different narrative events. Thus, a player may feel as if he or she has beaten *Heavy Rain* when every one of the game's narrative possibilities is exhausted and each "ending" and significant narrative event has been achieved.

TEMPORAL AND SPATIAL REWARD STRUCTURES MAY ENCOURAGE PLAYERS

Many games feature narrative or visual rewards for successful players in the form of images or cutscenes. An early example of these rewards occurs in *Pac-Man* (1980); after the completion of certain levels, players are shown one of three "intermissions," short narrative animations. *Metroid* (1986) offers different endings depending on how quickly players complete the game, with the main character, Samus Aran, removing her mask or Power Suit for a faster completion, with the fastest featuring Samus waving at the player in a bikini and boots, one of many different Ending Outfits in the series.

The practice of speedrunning emerges from such time-based reward systems, taking them to their natural extreme. The most obvious goal of speedrunning is to complete an entire video game in the shortest possible time. However, the fact that speedrunners often exploit obscure elements of a game's code to finish so quickly suggests that another goal of the practice is to play well-known games in unusual and even virtuosic ways. Although some players showcase their ability to use the original interface for a game to perform a speedrun, tool-assisted speedruns use emulators to slow down or speed up a game or even to analyze the game on the level of source code. Seb Franklin writes that speedrunning "exposes the abstract functions that underpin the seemingly linear map and sets of objectives that make up major or 'conventional' gaming experiences" (Franklin 2009, 173). In this sense, speedrunners play against the fabric of the game, "beating" the game's code to achieve unconventional outcomes. Rainforest Scully-Blaker (2014) identifies two distinct styles of speedrunning with different goals: "finesse runs" retain the narrative architecture of a game, while "deconstructive runs" tear down the narrative boundaries of games. In either speedrunning practice, players may compete to beat other players' records or to beat the computer by executing button-press combinations shown to be possible by tool-assisted runs but never before completed by a human player.

“BEATING” OTHER PLAYERS

Players’ differing gameplay priorities can result in conflict in multiplayer gaming environments. Richard Bartle offers an early model of four types of players in multiuser domains (MUDs) that he terms “hearts, clubs, diamonds [and] spades” (Bartle 1996). Hearts value socializing; clubs attempt to kill other players; spades “dig around for information,” attempting to master all aspects of the game’s geography and mechanics; and diamonds seek treasure, items, and achievements.

The practice of *griefing*, in which players in massively multiplayer online role-playing games (MMORPGs) intentionally disrupt other players’ gaming, is one method in which gamers beat other players in a game world. Chek Yang Foo and Elina M. I. Kovisto, in an interview-based study of so-called grief play, suggest that some players may believe they have been intentionally griefed by other players when those other players’ actions were in fact unintentional. Foo and Kovisto also introduce the related term *greed play*, in which players attempt to benefit regardless of whether they do so at the expense of other players. As in *ninja looting*, in which players steal items earned by other players, and *kill stealing*, in which players participate in killing a mob of enemies to receive some of the “rightful” benefits of the players who started the battle, “the actor will do anything to win; he follows the operational rules of a game, but violates the *spirit* of the game and its implicit rules” (Foo and Kovisto 2004, 249).

Online gaming networks such as PlayStation Network (PSN) and Xbox Live allow gamers to compete against each other through both multiplayer and single-player games. Systems of points or levels visible to other gamers on the network allow gamers to compare statistics about their gaming performance. Achievement-oriented gamers on the PlayStation Network have complained that the PSN trophy system is inadequate for competition against other gamers compared with the “gamerscore” and “achievements” offered on Xbox Live (Chubb 2010). However, IGN contributor Greg Miller argues that PS3 trophies are more fun to collect because the PSN’s abstract “levels” “grade on a curve” compared to Xbox Live’s mathematical “gamerscore” (Miller 2009).

CAN ALL GAMES BE BEATEN?

Not all definitions of a game include a definite end or win condition. In their review of game theory, Katie Salen and Eric Zimmerman identified “conflict or contest” and “goal-oriented/outcome-oriented” as relatively controversial qualities; some theorists believed they were necessary to the definition of a game, while others did not. In their own definition, Salen and Zimmerman chose to include “quantifiable outcome” as a necessary quality (Salen and Zimmerman 2004, 79–80). When used as part of a definition of games, the quest to “beat”—the game, the computer, other players, or one’s own record—separates the structure of a game from the larger category of playful activity.

Using the phrase “beating a game” to mark a quantifiable outcome may reveal a speaker’s national, linguistic, or cultural context. Anecdotal evidence collected by Leigh Alexander (2014) argues the concept of “beating” a game is most popular in the United States, Canada, China, and Israel. Alexander’s readers around the world also suggest the synonyms “finishing” (UK), “clearing” (Japan), “passing” (Mexico/Venezuela/Russia/Croatia), “clocking” (Australia/New Zealand), “playing/gambling through” (Germany), “closing” (Egypt), and “seeing the ending” (Korea), among others.

Teddy Pozo

See also: Cheating; Game Design

Further Reading

Alexander, Leigh. “‘Beating’ Games around the World.” Gamasutra, February 10, 2014. Available at https://www.gamasutra.com/view/news/209900/Beating_games_around_the_world.php.

Bartle, Richard. “Hearts, Clubs, Diamonds, Spades: Players Who Suit MUDs.” *Journal of MUD Research*, 1996. Available at http://www.mud.co.uk/richard/hcds.htm.

Budra, Paul. “American Justice and the First-Person Shooter.” *Canadian Review of American Studies* 34, no. 1 (2004): 1–12.

Chubb, Peter. “PS3 Trophies vs. Xbox 360 Achievements: Are Trophies Inferior?” PR: Product Reviews News, June 28, 2010. Available at http://www.product-reviews.net/2010/06/28/ps3-trophies-vs-xbox-360-achievements-are-trophies-inferior/.

Foo, Chek Yang, and Elina M. I. Kovisto. “Defining Grief Play in MMORPGs: Player and Developer Perceptions.” *Proceedings of the 2004 International Conference on Advances in Computer Entertainment Technology ACE*, June 3–5, 2004, Singapore: 245–250.

Franklin, Seb. “We Need Radical Gameplay, Not Just Radical Graphics.” *simploke* 17, nos. 1–2 (2009): 163–180.

Gazzard, Alison. “Unlocking the Gameworld: The Rewards of Space and Time in Videogames.” *Game Studies* 11, no. 1 (February 2011). Available at http://gamestudies.org/1101/articles/gazzard_alison.

McGonigal, Jane. *Reality Is Broken: Why Games Make Us Better and How They Can Change the World*. New York: Penguin Press, 2011.

Miller, Greg. “The PS3 Perspective: Achievements Suck and Trophies Rock.” IGN, December 3, 2009. Available at http://ps3.ign.com/articles/105/1052005p1.html.

Ryan, Marie-Laure. “From Narrative Games to Playable Stories: Toward a Poetics of Interactive Narrative.” *StoryWorlds: A Journal of Narrative Studies* 1 (2009): 43–59.

Salen, Katie, and Eric Zimmerman. *Rules of Play: Game Design Fundamentals*. Cambridge, MA: MIT Press, 2004.

Scully-Blaker, Rainforest. “A Practiced Practice: Speedrunning through Space with DeCerteau and Virilio.” *Game Studies* 14, no. 1 (August 2014). Available at http://gamestudies.org/1401/articles/scullyblaker.

Wolf, Mark J. P. "Accessing Interactivity in Video Game Design." *Mechademia* 1 (2006): 78–85.

Bemani

Bemani is the music and rhythm game division of the Japanese company Konami. It was originally called the Games & Music Division when it was established in 1997.

Konami released *Beatmania* (1997), its first rhythm game, in Japanese arcades in December 1997. The game put players in the roles of club DJs who had to win the praise of their audience by correctly pressing the correct controls as dictated by on-screen events. The controls were made up of five buttons, three white and two black, and a turntable. The arcade machine had two sets of these controls, one for each player. The screen displayed two sets of four vertical columns, each column separated by vertical gray lines. Beneath the three leftmost columns were five buttons that resembled the keys on a piano. A white key was at the bottom of each the three columns, and two black keys were beneath the two vertical gray lines that surrounded the center columns. These five keys corresponded with the five buttons on the control, and the physical turntable corresponded with its own on-screen icon that was beneath the column on the right.

During the game, as popular songs blared through the cabinet's speakers, various blocks descended along the columns and gray separator lines. The player's job was to press the correct button just as the shape hit the corresponding key at the bottom of the screen. If a shape fell down the fourth column, the player had to rotate the turntable. The object of the game was to hit the correct buttons at the same moment that the on-screen shapes hit the corresponding keys.

Beatmania was an instant hit in Japan, and several new editions (mixes) featuring new songs were introduced during the following years. Home versions of the game appeared on the PlayStation that could be used with a standard PS controller or a special controller that mimicked the controls from the arcade version. Other home editions included the Game Boy Color, WonderSwan, and handheld versions. Konami released new arcade editions of the game through July 2002, ending with the release of *Beatmania: The Final*.

Beatmania was released in the United States under the name *Hiphopmania*, but it was not successful. However, in 1998, Konami released its most well-known game, the worldwide hit *Dance Dance Revolution*, the object of which was to press the correct controller button that corresponded with a note on the screen. In this case, the controller was a mat on the floor, and players had to stomp the buttons with their feet. On a "stage" in front of the game cabinet, a player stood on the center tile of a three-by-three arrangement of tiles that featured arrows pointing away from the player. On the screen, arrows scrolled upward and passed over a set of stationary guide arrows. When the two arrows met, the player had to step on the tile containing the arrow that matched the one on-screen. *Dance Dance Revolution* was almost as fun to watch as it was to play, and spectators stood around *Dance Dance Revolution* cabinets, gawking at the players simulating dancing as they attempted to keep up with the on-screen arrows.

In 1999, Konami changed the name of its music and rhythm division to Bemani, a contraction of its best-selling game (BEatMANIa). That February, Bemani developed a new game, *GuitarFreaks* (1999), which once again consisted of playing a song by hitting the correct buttons on a controller that matched on-screen notes. This time, the controller resembled an electric guitar that consisted of three buttons and a switch. A guitar icon also floated on the screen, and when it reached the correct point, the gamer had to raise the guitar controller and produce a "wailing bonus."

Konami followed *GuitarFreaks* with a companion game called *DrumMania* (1999). It borrowed the same general gameplay as Konami's prior rhythm games but used a drum kit as its controller. Arcade owners also had the option of linking a *GuitarFreaks* cabinet with *DrumMania*, which allowed for cooperative play.

In 2000, Konami released *Keyboardmania*, with similar gameplay to prior Bemani games, except that players used twenty-four-key keyboards. *Keyboardmania* could also be linked with *GuitarFreaks* and *DrumMania*. For the home, a PlayStation 2 version was released with its own keyboard controller.

The Bemani division of Konami continues to develop and release innovative music-themed games that combine video with interactivity. *Dance Rush* (2018) has players standing on a multicolored LED platform, which in reality is a large touchscreen, and the changing graphics dictate the players' moves. While it is somewhat similar to *Dance Dance Revolution*, it literally brings the action from the screen right to the players' feet as the targets on the screen come forward, appear to leave the screen, and proceed onto the platform where the player can stomp on them.

In 2019, the company revealed that it would be releasing new exclusive smartphone versions of its early hits, including *Beatmania IIDX* and *Dance Dance Revolution*.

Leonard Herman

See also: Konami

Further Reading

Herman, Leonard. *Phoenix IV: The History of the Videogame Industry*. Springfield, NJ: Rolenta Press, 2016.

"Konami to Release 3 New Bemani Music Rhythm Games for Smartphones." AnimeNewsNetwork, January 29, 2019. Available at https://www.animenewsnetwork.com/news/2019-01-29/konami-to-release-3-new-bemani-music-rhythm-games-for-smartphones/.142702.

"What Is Dance Rush?: Konami's Bold New Dancing Game." OttaQuest, February 19, 2018. Available at http://www.otaquest.com/what-is-dance-rush-konami/.

Biomechanics

Biomechanics is the application of principles derived from physics to living organisms. As the term suggests, biomechanics combines the disciplines of biology and mechanics—or the physics of various phenomena, such as inertia and gravity—to explain and predict how many physiological processes work, from blood circulation to animal locomotion. As bioengineering professor Y. C. Fung notes, "For an organism, biomechanics helps us to understand its normal function, predict changes due to alterations, and propose methods of artificial intervention" (Fung 1993, 1). Biomechanics is concerned with describing organisms under a variety of conditions, whether at rest or in motion, and the forces such organisms may exert or sustain. Many of the principles applied in biomechanics—and the mathematics that formulate them—are derived from Newtonian physics, such as the laws of thermodynamics and motion, as well as equations for fluid dynamics. With respect to video gaming, biomechanics influences the design of physical interfaces, such as the keyboard, mouse, gamepad, and a variety of motion- or touch-sensitive controllers, which allow for interaction between player movements and on-screen images.

Although the term *biomechanics* did not emerge until the 1970s, the principle of drawing affinities between the properties of physical processes and living organisms can be traced back to Aristotle's studies of animals. However, it was a contemporary of Galileo, Giovanni Alfonso Borelli (1608–79), who demonstrated the applicability of mechanics to biological study and is today considered the father of biomechanics (the American Society of Biomechanics annually grants a Borelli Award for leading work in the field). Borelli's *On the Movement of Animals* (*De Motu Animalium*, 1680) illustrates how mathematics related to levers could accurately describe the implications of various loads on the human spine as well as provide mechanical models for muscular contractions, the beating heart, and intestinal motility. Today, biomechanics is closely aligned with kinesiology, the study of human movement, although biomechanical principles and applications can be found in a variety of disciplines related to the human body, such as medicine, sports, ergonomics and human factors, and performance and other visual arts.

BIOMECHANICS AND THE MOVING IMAGE

The history of the moving image is intertwined with the study of biomechanics, which spurred developments in photography and film in the nineteenth century. A wager on the biomechanics of a horse's gallop—whether one of its hooves is always touching the ground—compelled photographic pioneer Eadweard Muybridge (1830–1904) to improve the speed of photographic exposure. In 1877, Muybridge successfully captured a single image of a horse in motion, revealing that all of its hooves leave the ground midstride. The following year, Muybridge created a multicamera setup that could photograph the complete cycle of a horse's gait through a series of sequential images. Muybridge's advances sparked technical, popular, and artistic imagination, and his motion studies and technological developments attained wide influence (including depictions of movement among older visual arts, such as Marcel Duchamp's painting *Nude Descending a Staircase, No. 2* [1912]). However, critics contend that Muybridge's multicamera setup and unscientific methods lacked the precision and consistency required for serious biomechanical study.

Physiologist Etienne-Jules Marey (1830–1904) arguably addressed many of these concerns with his more scientifically rigorous approach to recording movement. In 1882, Marey developed the chronophotographic gun, which shot twelve frames a second at precise intervals through a single lens—a key development for analyzing real-time motion from a fixed vantage point. Marey later developed the double-use camera, which took high-speed pictures and could expose them on either a fixed plate or on celluloid film to create moving images. Paradoxically for Marey, photography's surfeit of visual information obscured the biomechanical functionality he intended to study; as a countermeasure, he dressed figures completely in black and set them against similarly dark backgrounds, outlining in white only the key joints and limbs he wished to record on film.

Ultimately, the efforts of Muybridge, Marey, and others to study movement through space and time yielded cameras and projectors useful for both scientific and artistic purposes. In the twentieth century, film would become a product of scientific modernism and a record of its key concerns—specifically, a fascination with the moving human form in a variety of industrial, personal, and recreational contexts.

BIOMECHANICS AND VIDEO GAMES

Within computer and electronic culture, biomechanical considerations can be identified in two areas: in the space of the screen, where fidelity of character movement to a real-world counterpart or to viewer experience of such movement may be essential, and in the interface itself, with which the player or user manipulates digital objects via biomechanical input. Contemporary motion-capture techniques—for computer modeling, film special effects, and video game animation—are reminiscent of Marey's efforts to isolate the function of movement within the body's form. In the modern version, the movements of live actors (such as professional athletes) are recorded digitally as points, creating a biomechanical frame that can be composited with the animated or photo-realistic likeness of the figure. Video game interactivity takes such recreations a step further, as simulated game world mechanics (such as gravity and collision detection) and animation (such as character movement) are combined with the real-world biomechanics of the player. Most computer and video game interfaces or controllers (such as keyboard, mouse, joystick, gamepad, etc.) are designed to translate movements of the finger, hand, and wrist (such as pressing a button or pulling a lever) into an on-screen result.

In the twenty-first century, biomechanical considerations have expanded with the proliferation of gestural interfaces, devices that mobilize more of the body's biomechanical ability for input and often evoke movements used in other settings. The introduction of the Nintendo Wii in 2006 began a trend in game and interface design that paired well-known games, such as tennis, golf, and boxing, with motion-sensitive controllers (such as Nintendo's Wiimote, Sony's Move, and Microsoft's Kinect) to bring the sensation of swinging, chipping, punching, and other activities to video gaming. Apple's iPhone, which debuted in 2007, has similarly changed the interface landscape for mobile media devices, as the screen itself is responsive to touch, orientation, and movement. The next frontier for biomechanics and games are virtual, augmented, and mixed reality applications, from head-mounted devices that track looking movements to gestural and haptic devices for hands and the rest of the body. Although such interfaces are relatively new to home consoles and mobile media devices, the arcade market has long developed one-off or game-specific interfaces exploring various types of bodily movement; one notable example that traversed the arcade/home divide is *Dance Dance Revolution* (1998), which features a pressure-sensitive pad for players to coordinate elaborate dance movements with musical and visual cues.

Professionals from various fields continue to explore the implications of increased biomechanical input on various theoretical concepts, on utility and efficiency, and on the body and its health. The *New England Journal of Medicine* has noted an increase in what it calls "Wii-itis," or injuries sustained to muscles and joints by overuse of gestural interfaces, although carpal tunnel syndrome remains the most diagnosed interface-related injury due to the prevalence of the keyboard and mouse. Personal trainers and rehabilitation experts are evaluating the substitution of biomechanically expansive interfaces for other forms of exercise, and designers are questioning whether the use of accelerometers, touch-sensitive screens, and other motion-enabling technologies are truly good design or simply mere novelty. For video game scholars, the emergence of new interfaces and their biomechanical consequences generate compelling research questions about the nature of interactivity and the experience of video game play.

David O'Grady

See also: Accessibility; Controllers

Further Reading

American Society of Biomechanics website. Available at https://asbweb.org/.

Auerbach, Jonathan. *Body Shots: Early Cinema's Incarnations*. Berkeley: University of California Press, 2007.

Braun, Marta. *Picturing Time: The Work of Etienne-Jules Marey (1830–1904)*. Chicago: University of Chicago Press, 1995.

Fung, Y. C. *Biomechanics: Mechanical Properties of Living Tissues*. 2nd ed. New York: Springer, 1993.

Interactions magazine website. Accessed September 6, 2020. Available at http://interactions.acm.org/index.php.

Knudson, Duane. *Fundamentals of Biomechanics*. 2nd ed. New York: Springer, 2007.

Norman, Donald A. *The Design of Everyday Things*. New York: Basic Books, 2002.

Solnit, Rebecca. *River of Shadows: Eadweard Muybridge and the Technological Wild West*. Boston, MA: Penguin, 2004.

BioShock Series

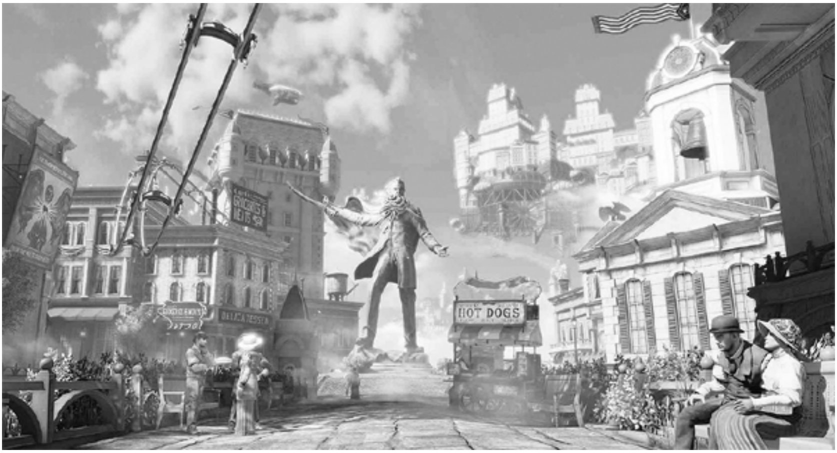
The *BioShock* series is a franchise of first-person shooting games that includes *BioShock* (2007), *BioShock 2* (2010), and *BioShock Infinite* (2013). *System Shock 2* (1999) shares gameplay and narrative elements with *BioShock* and is an important progenitor of the series. *BioShock* was developed by Irrational Games (at the time named 2k Boston) and a team led by game designer Ken Levine. It was originally released on the Microsoft Xbox 360 and Windows. A version for the Sony PlayStation 3 followed in 2008. The game received extensive critical praise, particularly for its emotional and intellectual approach. It was among the best-selling games of 2007.

The level-based gameplay of *BioShock* combines traditional first-person shooter gunplay and physical powers such as electrical- and fire-based attacks that players are able to mix to achieve unique effects. Weapons and powers are upgradable, adding an aspect of role-playing to the game. *BioShock* is set in Rapture, an underwater city built by the business magnate Andrew Ryan. Rapture is significant both for its art deco architecture and sophisticated art design and for drawing on philosophical ideas expressed in Ayn Rand’s *Atlas Shrugged* (1957).

Set in 1960, the story begins with the protagonist, Jack, surviving an air crash in the Atlantic and using a bathysphere to enter the city of Rapture. Exploring Rapture, Jack encounters various Splicers, who are the former inhabitants of Rapture now physically and mentally disfigured by their use of genetic modification technology. Jack is guided through a number of tasks by a man named Atlas, with whom he communicates through a radio. Jack also hears messages from Andrew Ryan that warn him to curtail his hostile activities and explain the politics of Rapture.

Jack has frequent encounters with the Little Sisters and Big Daddies. The Little Sisters are little girls designed for the purpose of extracting ADAM from the bodies of Splicers, a substance that Jack needs to upgrade his own abilities. The Big Daddies are the protectors of the Little Sisters, although they become a threat only if the player initiates combat. Having defeated a Big Daddy, Jack is free to “harvest” or “save” the accompanying Little Sister. The game has three possible endings, differing in content and emotional tone, that depend on how the player chooses to deal with the Little Sisters.

BioShock is famous for a narrative twist. Eventually Jack learns that Atlas is actually Frank Fontaine, Ryan’s competitor for the control of Rapture. Furthermore, Jack is Ryan’s illegitimate son, genetically modified and conditioned to respond to the use of the phrase “Would you kindly.” This phrase is revealed as the means through which Jack has been manipulated to do Atlas/Fontaine’s bidding in the earlier parts of the game. In a final defiant act, Ryan employs the phrase to have Jack kill him with a golf club. The remainder of the game is spent taking revenge on Fontaine with the aid of the Little Sisters.



An image of Columbia, the flying city in *BioShock Infinite*. (Courtesy of Mark J. P. Wolf)

BioShock was followed by a sequel in 2010, developed by 2k Marin and released on the Microsoft Xbox 360, Windows, and PlayStation 3. *BioShock 2*, in which the player takes on the role of a Big Daddy, further explores the fall of Rapture and introduces the Big Sisters.

In 2010, Irrational Games announced *BioShock Infinite* (2013) for a release in 2012 on PlayStation 3 and Xbox 360. The game is set in an alternate 1912 against the political backdrop of American exceptionalism within the flying steampunk city of Colombia. The plot of the game finds the player character, Booker Dewitt, rescuing the character Elizabeth and battling through the war-ravaged city. The game explores the philosophical issues of freedom, choice, and fate. A phrase uttered late in the game, “There’s always a lighthouse,” concerns the similarities of games in the *BioShock* series, and beyond this, the structural similarities of games and their repeated playings. *BioShock Infinite* also includes several late game narrative twists and is famous for the dense and intricate nature of its ending. The game was an enormous critical and commercial success, with particular praise reserved for the aesthetics of the setting of Columbia, the complex narrative, and the AI companion Elizabeth.

A two-part expansion for *Bioshock Infinite*, *Burial at Sea* (2013, 2014), further explored the connection to the original *BioShock*. Remastered versions of all three games in the series and their expansions were released in 2016 as the *BioShock Collection*. In 2014, Ken Levine announced that Irrational Games would be closing, apparently ending his role in the series.

Grant Tavinor

See also: Microsoft Xbox 360

Further Reading

El Kanafi, Mehdi. *BioShock: From Rapture to Columbia*. Toulouse, France: Third

Editions, 2018.
Tavinor, Grant. *The Art of Videogames*. Malden, MA: Wiley-Blackwell, 2009.

Blu-Ray Disc Games. *See* DVD and Blu-Ray Disc Games

Board Games

Board games extend back into ancient times and have been found buried in Egyptian tombs. They generally consist of some small physical playing field or surface (the “board”) and pieces that players move from one position to another, usually in competition to complete some goal, such as getting to some location first, the capture of other players’ pieces, or the completion of some strategic configuration, all according to some set of rules that players agree to follow. Many aspects of board games appear in video games as well, including the idea of a playing field, avatars, rules, goals, turn taking, win-lose conditions, points and scoring, the importance of relative positioning, and more. Several board game companies, such as Milton Bradley and Parker Brothers, also produced video games and occasionally even game consoles (e.g., the GCE/Milton Bradley Vectrex).

A common link between board games and video games is the video game adaptation of a board game, like those produced for public domain games such as chess, checkers, and Go or copyrighted games such as *Monopoly* or *Scrabble*. Computer chess programs have even been used as a means of benchmarking computer performance (the first chess-playing computer program was written in 1950). Early examples of commercial adaptations of board games include the Atari VCS 2600 games *Video Chess* (1979), *Othello* (1980), and *Video Checkers* (1980).

Board games and video games have often influenced each other’s designs. First, there are hybrid games, video games that were combined with board game materials in some way. The first home video game system, the Magnavox Odyssey, used board game supplies along with some of its games, including dice, poker chips, paper money, and score sheets. Three games for the Philips Videopac video game system, *Conquest of the World* (1982), *Quest for the Rings* (1982), and *The Great Wall Street Fortune Hunt* (1982), all involved on-screen video game play as well as a game board with movers, combining video game play and board game play. Second, some video games are designed like board games, even though they are not adaptations of existing board games: for example, the arcade game *Ataxx* (1990), the home computer game *Hexxagoμn* (1993), and *Mario Party* (1998). A number of board games have used video as an element of the game, first on videotape and later on DVD, such as the *Clue DVD Game* (2006) or *The Lord of the Rings DVD Trivial Pursuit* (2004). Despite the use of interactive video, these games would not be considered video games by most definitions because the players’ pieces move around on the physical board rather than on-screen.

Finally, a growing number of board games are based on video games, including *Pac-Man Game* (1982), *Super Xevious* (1985), *Myst: The Puzzling New Board Game Adventure* (1998), *World of WarCraft: The Board Game* (2005), *StarCraft: The Board Game* (2007), *Bioshock Infinite: The Siege of Columbia* (2013), and *Portal: The Uncooperative Cake Acquisition Game* (2015).

Mark J. P. Wolf

See also: Adaptation

Further Reading

Berlinger, Yehuda. "A Guide to Board Games and Card Games Based on Video Games." *Life Intersects Games* (blog), January 29, 2008. Available at http://jergames.blogspot.com/2008/01/guide-to-board-and-card-games-based-on.html.

Roberts, David. "The Best Video Game–Themed Board Games You Can Buy." GamesRadar+, March 3, 2017. Available at https://www.gamesradar.com/10-amazing-video-game-themed-board-games/.

Boss Keys

Boss keys are a meta-feature of computer (not console) games that temporally suspends an ongoing game to hide it from approaching supervisors, colleagues, clients, or family members. With the single press of an easy-to-reach key, the game is instantly paused, the game audio is stopped, and the visuals are changed into something unsuspicious, such as a (functional or dysfunctional) DOS command prompt or (fake) spreadsheet program. There is no confirmation dialogue; invoking the boss key is thus faster than regularly quitting the game. The boss key typically works at any point in the game (menu screen, game screen, high score screen, etc.). After exiting the boss key function, the game usually resumes. No convention exists in regard to keys used, though keys in the top row of the keyboard (ESC, function keys) appear to be popular.

Roger Wagner, the president of Southwestern Data Systems, came up with the idea of the boss key in March 1981 and prompted developer John Besnard to implement it in his Apple II game *Bezare* (1982). The function was invoked with Ctrl-W, and showed a VisiCalc-style spreadsheet program (Roger Wagner in an Interview with Chris Torrence, March 24, 2015 https://archive.org/details/RogerWagnerInterview, from 10'09).

Boss keys were an ordinary (although not a particularly frequent) feature in the mid-1980s and early 1990s in games people might play on computers at work or in games with dubious content. Game titles with boss keys usually run on DOS, not on 8-bit or 16-bit home computers, although game conversions might preserve boss keys across platforms. Boss keys are unlikely to be present in arcade game conversions. Popular games with boss keys include *Star Wars* (Brøderbund, DOS, 1989), *Tetris* (Spectrum Holobyte, DOS, 1987), *Wolfenstein 3-D* (id, DOS, 1992), and *Leisure Suit Larry* (Sierra Entertainment, DOS, 1987), although other Sierra games, such as *King's Quest* (IBM PCjr, 1984) and *Space Quest* (DOS, 1986), do not have boss keys. It remains unknown how successful the feature actually was in practice, as many boss key screens are obviously fake. Either it was felt that one only needed enough to satisfy a casual glance at a distance or that players would rather be caught with a fake display than with a possibly dodgy game.

The manual for the submarine simulation *688 Attack Sub* (Electronic Arts, DOS, 1989) explains that the implemented boss key feature avoids a potentially "painful attitude adjustment" by the boss when being caught playing "a quick game of 688" at work. The player is instructed to press the F10 key to "pause the game" and "replace the screen with a bogus DOS prompt" and then to "[w]ander off to the coffee machine or make it look like [he/she is] doing something of vital importance to the company." The "infinitely more interesting game" can be resumed with a second press of F10, "[w]hen the offending supervisor is out of view." Children are advised that the same practice also works "just as well with the parental unit" (Electronic Arts, *688 Attack Sub User Manual*, 1989, 35). Players should be aware, however, that in this game, the boss key only works in-game (not in menus), and the "bogus DOS prompt" is inoperable and does not register keystrokes.

In the *Tetris* clone *BLOX* (Graham Cluley, DOS, 1990), a press of the boss key ESC brings up a fully functional spreadsheet application; a press of F1 informs the player that it is fake, and a press of the TAB key resumes the game.

The boss key feature in games went out of fashion by the mid-1990s, presumably because players were likely to own the computers they were playing on; they were playing at home and in their own time. The appearance and diffusion of windowed operating systems with easy and fast task switching in the mid-1990s also made boss keys technically redundant. Today, online gaming at the workplace is typically spotted by port analyses or deep packet inspection (DPI) of the network traffic. Boss keys may still have a niche application in porn games; but even there, they are probably more of a winking reference to the past than an essential game meta-feature.

Daniel Cermak-Sassenrath

See also: Computer Games

Further Reading

"Boss Key." Wikipedia. Last edited June 15, 2020. Available at https://en.wikipedia.org/wiki/Boss_key.

Torrence, Chris. "Roger Wagner Publishing – Roger Wagner." March 24, 2015. Available at https://archive.org/details/RogerWagnerInterview.

Brazil

Throughout the last twenty years, research on digital games has increased significantly (Alves 2013) along with worldwide game production, including the Brazilian industry. The report financed by Banco Nacional de Desenvolvimento

Econômico e Social (BNDES) (GEDIGames 2014), which mapped the video game industry in Brazil, included 133 Brazilian companies that were interviewed and revealed that the industry is mostly new and involves small companies with an average of 8.5 employees per company. From 2013 to 2014, 97.8 percent of the companies produced entertainment games (13.5% for international clients, 24.1% for national clients, and 16.7% for the consumer market); 48.1 percent produced serious games; 30.1 percent produced advergames; 29.3 percent produced educational games; 15 percent produced corporate training games; 7.5 percent produced games for simulators; and 3.8 percent produced games for health. Also, 81 percent were developing games for mobile devices (cell phones or tablets), while only 8 percent were developing games for home consoles (Source: Sakuda and Fortim 2018).

The BNDES initiative identified the limits and possibilities of the video game industry and also pointed to the processes of professional formation and existing research, funding new decisions, and changes that strengthened the industry. Such results also contributed to the founding of the Agência Nacional do Cinema (ANCINE) and bringing it to public notice. The agency was traditionally characterized by propositions regarding cinema and video; now, it included digital games. The aforementioned public notice, in its first version, included 123 electronic games projects aimed at commercial use in consoles, computers, or mobile devices; of these, 24 were approved. Among them, the game called *Árida: Backland's Awakening* (2019), by Aoca Game Lab (http://aocagamelab.games/pt/), which is part of Comunidades Virtuais at the State University of Bahia (UNEB), is an adventure game (with elements of survival games) whose narrative portrays Cícera, a girl who lives in Bahia's Sertão in the nineteenth century. Aoca Game Lab has chosen to produce games that value Bahia state culture, even though they were aware of the difficulties involved in entering a global market with that kind of product.

In the second round of the public notice, 22 out of 167 project applications from all parts of the country were approved, and these were from nine federation units. Then, the project *Elderand*, by Mantra Filmes (http://mantrafilmes.com.br/), was approved. *Elderand* is an action, RPG, pixel art game that is also characterized as *metroidvania* (a subgenre of the action-adventure genre of video games). It tells the story of a bounty hunter whose objective is to awaken a cosmic entity on a mystical land. Other important developments of the study are the implementation of the 2nd Census of Digital Games Brazilian Industry and the Brazilian Catalogue of Digital Games, both funded by the Ministry of Culture (www.gamesbr.net.br).

Although timidly, the Brazilian digital games industry has been articulating itself through these public interventions that finance projects, mappings, the registering of what is being produced by developers, and meetings for socializing, discussing, and creating business rounds in the pursuit of funding for projects, such as the BIG Festival (Brazil's Independent Games Festival) (https://www.bigfestival.com.br/take-part.html/). The BIG Festival is in its seventh year, and it enables those exchanges, awarding money to national and international games, and has become the most important independent games festival in Latin America, providing incentives and supporting the field.

In 2017, *Distortions*, by Among Giants, was chosen as the best Brazilian game by popular vote at the BIG Festival. It tells the story of a girl who uses her violin to play music as a weapon to change the world around her.

Other games of relevance are *Rocket Fist* (2015), by Bitten Toast Games, and *Dandara* (2018), by Long Hat House, both available for Nintendo Switch. *Rocket Fist* (2015), described as a "couch multiplayer," presents robot battles inspired by child's play called *queimada*, and it was the first Brazilian game for Nintendo Switch. The game *Dandara* (2018) is a metroidvania inspired by a female slave who fought against the enslaving of her people in the Quilombo dos Palmares, in Alagoas, during the seventeenth century.

Another game of relevance is *Toren* (2015), by Swordtales, an adventure game that invites the player, as the young warrior Moonchild, to climb steep steps, solve various puzzles, and overcome traps to find the way to freedom and redemption. This was the first game financed by the Rouanet Law of the Ministry of Culture, which as of December 2011, through ordinance 116, started to include financing for electronic games. That law, via tax incentives, raises funds to widen investments in the cultural field.

The actions described above have strengthened the digital games ecosystem in Brazil, broadening the conception that the Ministry of Culture and other governmental agencies have of digital games. Thus, such games start being perceived as audiovisual products as well, making the availability of resources via budget lines and public notices possible, enabling indie developers to implement their projects, and internationalizing and delineating new pathways for the industry in Brazil.

Within that context, the preoccupation with the processes of formation, aimed at training professionals, has been increasing over the last eleven years, initially through private institutions located in the south and southeast regions and, during the last five years, in the northeast, center-east, and northern parts of the country and also in public institutions. According to *Guia do Estudante*, published by Editora Abril, seventy-three courses were found throughout Brazil. The first public institution offering a course was Instituto Federal de Educação, Ciência e Tecnologia–Rio de Janeiro, Campus de Engenheiro Paulo de Frontin, in 2014, followed by Instituto Federal da Bahia–Campus Salvador (https://portal.uneb.br/salvador/cursos/jogos-digitais/) in 2017, and Instituto Federal da Bahia–Campus Lauro de Freitas (http://portal.ifba.edu.br/lauro-de-freitas/ensino/jogos-digitais) in 2018. These courses, completely free of charge and far from the great population centers, allow low-income people to train to enter the industry.

Lynn Rosalina Gama Alves

See also: Argentina; Chile; Colombia; Uruguay

Further Reading

Alves, Lynn. "Games e educação: Desvendando o labirinto da pesquisa." *Revista da* FAEEBA 22, no. 40 (2013): 177–186.

Capelas, Bruno. "Rocket Fist Is the First Brazilian Game for Nintendo Switch." Link, June 21, 2017. Available at https://link.estadao.com.br/noticias/games,rocket-fist-e-o-primeiro-game-brasileiro-a-sair-para-o-nintendo-switch,70001851469.

Editora Abril. “Jogos Digitais.” *Guia do Estudante*, updated May 27, 2018. Available at https://guiadoestudante.abril.com.br/busca/?filtro=graduacao&termo=Jogos%20Digitais.

GEDIGames (Grupo de Estudos e Desenvolvimento da Indústria de Games). *Relatório Final Mapeamento da Indústria Brasileira e Global de Jogos Digitais*. February 2014. São Paulo: USP/BNDES. Available at http://www.abragames.org/uploads/5/6/8/0/56805537/mapeamento_da_industria_brasileira_e_global_de_jogos_digitais.pdf.

Sakuda, L. O. and Fortim, I. (Org.). *2o Censo da Indústria Brasileira de Jogos Digitais*. Brasília: Ministério da Cultura, 2018.

Brown v. Entertainment Merchants Association

Brown v. Entertainment Merchants Association was the Supreme Court ruling that struck down a California law that made it illegal to sell violent video games to minors and consequently preserved the video game industry’s right to self-regulation of content.

Introduced by California state representative Leland Yee and signed into law in 2005, California Law AB 1179 prohibited the sale of violent video games to minors without parental permission, required merchants to display a special symbol on violent video games, and established a fine of up to $1,000 against merchants who sold to minors. The law specifically defined violent video games as games “in which the range of options to a player includes killing, maiming, dismembering, or sexually assaulting an image of a human being” that an undefined, assumed reasonable person would deem morbid, offensive, and lacking artistic merit.

Soon after the passage of the law, the Entertainment Merchants Association, joined by the Entertainment Software Association, successfully sued members of the California legislature in United States District Court for the Northern District of California for an injunction to prevent the implementation of the law. Governor Arnold Schwarzenegger and the State of California appealed the decision in the Ninth Circuit Court of Appeals, where the law was struck down again because of what the court determined were unconstitutional restrictions of free speech at the foundation of the law.

After losses in the lower courts, Governor Schwarzenegger appealed directly to the Supreme Court in 2009 for a ruling on the law—initially filed as *Schwarzenegger v. Entertainment Merchants Association*—with lawyers for the Entertainment Merchants Association arguing against the law before the court. The Entertainment Merchants Association’s argument against the law and Governor Schwarzenegger’s appeal alleged that the California law was unconstitutional because it violated the First Amendment. Specifically, they argued that video games, much like films and music, are forms of protected speech under the First Amendment, that the requirement to label violent video games is a violation of First Amendment protections, and that the State of California’s definition of the concept of “violent” is too vague to meaningfully or practically apply.

On June 27, 2011, the U.S. Supreme Court ultimately sided with the Entertainment Merchants Association and stuck down California Law AB 1179, citing its unconstitutionality. In a 7–2 ruling, with Justices Clarence Thomas and Stephen Breyer dissenting, the court found that video games did indeed qualify for First Amendment protections because "like books, plays, and movies, they communicate ideas through familiar literary devices and features distinctive to the media," and the basic principles of free speech do not vary among different media. Additionally, the court determined that the State of California did not satisfy the burden of proof necessary to show a compelling state interest and could not prove a connection between violent video games and their effects on children nor could the state prove that the law met a specific parental need to regulate video games that the industry's voluntary ratings system did not already accomplish.

Caren Pagel

See also: Violence

Further Reading

Brown v. Entertainment Merchants Association et al., 564, U.S. 786 (U.S. 2011).

Fisher, Jessica. "*Brown v. Entertainment Merchants Association*: 'Modern Warfare' on First Amendment Protection of Violent Video Games." *Journal of Business and Technology Law* 8, no. 2 (2013): 525–546.

Mott, Garrett Mathew-James. "Game Over for Regulating Violent Video Games?: The Effect of *Brown v. Entertainment Merchants Ass'n* on First Amendment Jurisprudence." *Loyola of Los Angeles Law Review* 45, no. 663 (2012): 633–655.

Wuller, Lindsay E. "Losing the Game: An Analysis of the *Brown v. Entertainment Merchants Association* Decision and Its Ramifications in the Area of 'Interactive' Video Games." *Saint Louis University Law Journal* 57, no. 457 (2013): 457–491.

Bulletin Board Systems (BBSs)

Computerized bulletin board systems (BBSs) appeared in the 1970s and were online services where one or multiple users could connect and exchange information, such as a software, electronic mail, and messages, on public message boards. The term *bulletin board system* is a reference to traditional cork-and-pin bulletin boards found in public spaces, where people can post announcements and news. Originally, BBS users utilized a terminal program to log in over a phone line using a modem. By the 1990s, some BBSs allowed access via Telnet or packet-switched networks, such as the internet. In many ways, the BBS was the first form of online community for many users.

The first significant computerized BBS was called the Community Memory Project, which started in 1973 and used hardwired terminals in neighborhoods in Berkeley, California (Rossman 1975). The first public dial-up computerized BBS, known as CBBS, went online February 16, 1978, in Chicago, Illinois, and was developed by Ward Christensen and Randy Suess, who began preliminary work on the system during the Great Chicago Blizzard of 1978 (Lee 2005).

Most BBSs were operated free of charge by computer hobbyists, known as *system operators* or *sysops*. Because BBSs were often operated out of homes, access was not always available because the technology was sometimes unreliable. Some BBSs, mostly file exchange or business services, charged subscription fees for use. Phone lines were used for access; thus, early BBSs were mostly local ventures because dialing outside calling areas incurred long-distance charges. Given that most users lived in close proximity to one another, BBS Meets or Get Togethers, where users gathered to meet face-to-face, were common. BBSs were generally operated by hobbyists, so it was common for discussions on the early boards to revolve around topics popular among technophiles.

As BBSs gained in popularity, a number of special interest boards began to emerge. Boards were available for most every hobby and interest, including politics, religion, personals, music, and alternative lifestyles. In addition, some BBSs carried themes, which were reflected in their names and on their welcome screens. Common themes included castles, dungeons, spaceships, pirate ships, sanatoriums, and circuses. Some "elite" or "warez" boards exclusively offered pirated software and required membership to exclude law enforcement ("lamers"). Despite these efforts, some of the BBSs providing illegal content were cracked down on. On July 12, 1985, the Private Sector BBS, the official BBS of the gray hat hacker quarterly magazine *2600*, was raided by the Middlesex County (New Jersey) Sheriff's Office in conjunction with a credit card fraud investigation. A BBS in Boardman, Ohio, Rusty n Edie's, was raided by the FBI in January 1993 for software piracy and later sued by *Playboy* magazine for copyright infringement. In 1996, the sysop of a BBS in Flint, Michigan, was charged with distributing child pornography.

BBSs were most popular from the late 1970s to the mid-1990s. The introduction of faster modems in the 1980s, 1200-baud modems versus the 110- and 300-baud modems in use during the late 1970s, led to an increase in popularity. The World Wide Web gradually began replacing BBSs in the mid-1990s, when BBS usage had reached its peak, but BBSing remains popular today in different parts of the world. A number of print publications sprang up around BBSs in the early 1990s, including *Boardwatch*, *BBS Magazine*, and *Chips 'n Bits Magazine*, and publications devoted to computer hobbyists often listed BBSs.

The early BBSs ran on microcomputers and customized homebrew software. However, by the early 1980s, BBS software was available for the home computer systems produced by Apple, Atari, and IBM. By the mid-1980s, a number of popular BBSs were running on the Commodore 64 and Commodore Amiga models. MS-DOS remained the most popular operating system until the introduction of the World Wide Web in the mid-1990s. Most BBSs were generally text-based, displayed using ASCII or ANSI, principally due to the limited bandwidth available through dial-up modems over analog landlines. Early use of custom character sets, such as ATASCII for Atari or PETSCII for Commodore, resulted in compatibility issues. By the late 1980s and into the 1990s, most BBSs began to employ ANSI art to incorporate graphics and color into their interface. Experimentation with ANSI art led to a BBS subculture of ANSI graphic artists.

One legacy spawned by early BBS computer hacker subculture was the slang known as *leet* or *l33t*, which comes from the word *elite*, referencing the membership-only BBSs frequented by hackers in the early 1980s. The use of l33t (or 1337) is unique in its substitution of other characters to represent letters in a word. Once exclusive to hackers, l33t has since entered mainstream culture. Versions of l33t are still used today by gamers and some web communities. N00bs, or newcomers, to online gaming are challenged to learn the l33t speak frequently used by gaming veterans. One could argue that a version of l33t is used by most everyone today who text messages or tweets.

Before popular use of packet-switched networks, BBSs with multiple phone lines offered chat rooms and online games where users could interact in real time. In the 1980s, door games, both single player and multiplayer, drew early online gamers. BBS "doors" allowed users to communicate with external programs, such as games, so games offered through BBSs were referred to as "Door Games." Some of first versions of these closely resembled board games. Players would submit their moves to the sysop or Gamemaster, and their moves were updated and posted daily or several times daily. Door games evolved, and soon many allowed for automation by the computer. Many BBSs with multiple phone lines, for simultaneous log-ins, offered ASCII text-based games that allowed users to compete or interact with one other in virtual environments. Some popular 1980s door games were *Trade Wars* (1984; a possible precursor to *EVE Online* [2003]), *Usurper* (1985), *Space Empire Elite* (1987), *LoRD* (*Legend of the Red Dragon* [1989]), and *The Pit* (1989).

Staci Tucker

See also: Online Games

Further Reading

Blashki, K., and S. Nichol. "Game Geek's Goss: Linguistic Creativity in Young Males within an Online University Forum." *Australian Journal of Emerging Technologies and Society* 3, no. 2 (2005): 77–86.

"An Explanation of l33t Speak." BBC, August 16, 2002. Available at http://www.bbc.co.uk/dna/h2g2/A787917.

Johnson, S. *Interface Culture: How New Technology Transforms the Way We Create & Communicate*. San Francisco, CA: Basic Books, 1997.

Lee, S. *BBS: The Documentary* (film), 2005.

Mitchell, A. "A Leet Primer." *TechNewsWorld*, 2005. Available at http://www.technewsworld.com/story/47607.html.

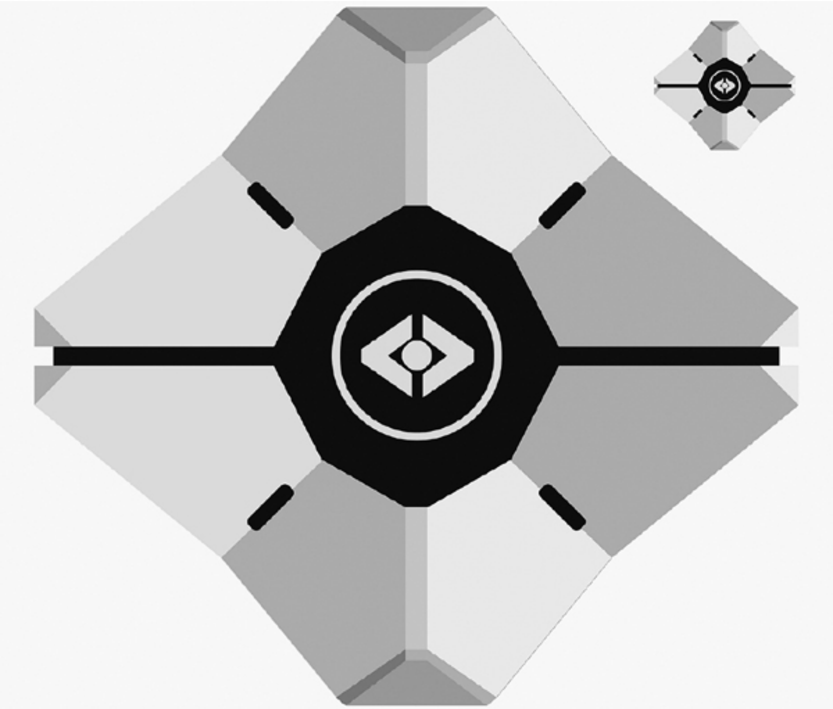
Perea, M., J. A. Dunabeitia, and M. Carreiras. "R34d1ng W0rd5 W1th Numb3r5." *Journal of Experimental Psychology: Human Perception and Performance* 34, no. 1 (2008): 237–241.

Rossman, M. "Implications of Community Memory." *ACM SIGCAS Computers and Society* 6, no. 4 (1975): 7–10.

Bungie

Bungie, Inc., is a video game company that has faced success and failure and changed its path multiple times to accommodate shifts in gaming culture. During the 2000s, games designed by Bungie changed the direction of the first-person shooter, with *Halo: Combat Evolved* (2001) becoming a killer app that dramatically altered the Microsoft Xbox console sales and install base, effectively linking the series with the publisher and console manufacturer. However, its biggest impact would be on multiplayer gaming within the console market, with *Destiny* (2014) changing how massively multiplayer always-online titles were received within the industry. By the time *Destiny 2: Shadowkeep* (2019) was released, Bungie had become its own publisher, effectively moving into a space where others had distributed its games and earning more control over its impactful content.

Bungie began in 1990 when University of Chicago mathematics undergraduate Alex Seropian worked on the *PONG* (1972) clone *Gnop!* and gave the game away for free. His next game was the top-down tank shooter *Operation: Desert Storm* (1991) for Apple Macintosh, the first game published under the official Bungie label. Seropian then brought in fellow Chicago student Jason Jones to code and released the role-playing game *Minotaur: The Labyrinths of Crete* (1992). Released through internet modems, the game was a solid success.



A vector illustration of the iconic Ghost from Bungie's game, *Destiny*. (Bruno Ismael Da Silva Alves/Dreamstime.com)

Bungie's success occurred largely on Macintosh platforms during the 1990s. In 1994, *Marathon* (1994) was a first-person shooter that introduced *rocket jumping* and *mouselook* (using the computer mouse to look up and down along with panning side-to-side). The sequel, *Marathon 2: Durandal* (1995), introduced cooperative play that allowed multiple players to face off against artificial intelligence (AI) opponents as a team. The success of these titles pushed Bungie to expand to the Windows 95 operating system, and its next title would be a multiplatform experience. *Myth: The Fallen Lords* (1997) introduced a fictional realm of orcs and humans with an emphasis on tactical strategy combat.

The next release Bungie would make was originally a third-person action title revealed in 1999. However, in 2000, Microsoft announced that they would be acquiring Bungie and incorporating it into its Microsoft Game Division. The first exclusive title moved from the third-person perspective to the first-person shooter, which had recently been popularized on the console market by titles like *Goldeneye: 007* (1997) on the Nintendo 64.

Halo: Combat Evolved would change the industry in a number of ways, especially as a Microsoft Xbox console exclusive. The military-themed science fiction first-person shooter was celebrated for its single-player campaign focused on the faceless Master Chief as he battles multiple alien species. Its multiplayer would soon become the standard-bearer for console play, with up to sixteen people able to compete in a single session through a local area network. It would become the initial popular leader of the Xbox Live online play platform when it was released in 2002. With over six million copies sold in North America, *Halo* became a defining game for the initial Xbox.

The sequel, *Halo 2* (2004), set sales records, including $125 million earned on its launch day, and also expanded the network capabilities of Xbox Live. *Halo 3* (2007) shattered those records, earning $170 million on its release date, cementing *Halo* as a megalithic entertainment property. The final *Halo* titles Bungie released were *Halo 3:ODST* (2009) and *Halo: Reach* (2010).

Bungie ended its Microsoft exclusivity deal and signed a large publishing deal with Activision. The partnership resulted in the massively multiplayer online (MMO) first-person shooter title *Destiny* (2014), which was a console-only title for the most recent console generation (Sony PlayStation 4 and Microsoft Xbox One). The game provided players with an online community of limited interaction mechanics compared to other MMOs and innovated cooperative play among disparate clans with limited public events available to users.

In 2019, Bungie announced that it was ending its deal with Activision and would self-publish its titles in the future, including upcoming *Destiny*-related content, such as the expansion *Destiny 2: Shadowkeep*.

Kyle Moody

See also: Activision; Microsoft Xbox

Further Reading

Parkin, Simon. *An Illustrated History of 151 Video Games*. London: Lorenz, 2014.

Reinhard, Andrew. *Archaeogaming: An Introduction to Archaeology in and of Video Games*. New York: Berghahn, 2018.

Schreier, Jason. *Blood, Sweat, and Pixels: The Triumphant, Turbulent Stories behind How Video Games Are Made*. New York: Harper, 2017.

Bushnell, Nolan (1943–)

Sometimes described as the "Father of the Arcade Video Game Industry," Nolan Bushnell was born in 1943 and raised in Utah, where he took over his father's concrete business at fifteen when the elder Bushnell passed away. While in high school, Bushnell also began working at an amusement park in Farmington, Utah, running electromechanical midway games. He studied electrical engineering at the University of Utah, one of four educational institutions in the United States that possessed a Digital Equipment Corporation PDP-1 mainframe computer. During this time, many games were programmed using the display and the PDP-1, including a pinball game, hockey game, and a ping-pong game. On another PDP-1 at the Massachusetts Institute for Technology (MIT), the computer game *Spacewar!* (1962) was developed by students and was considered the best game, and the program circulated to the other schools with a PDP-1.

While at the University of Utah, Bushnell became an avid fan of *Spacewar!* and later created the first mass-produced commercial coin-operated video game *Computer Space* (1971). *Computer Space*, which was largely based on *Spacewar!*, was developed by Syzygy Engineering, a company founded by Bushnell and Ted Dabney in 1969. Bushnell and Syzygy sold the rights to *Computer Space* to mechanical coin-operated game company Nutting Associates (founded by Bill and Dave Nutting), who ultimately released only three thousand units of the game (twenty-two hundred single-player units and eight hundred two-player units). Bushnell attributed the lack of success of *Computer Space* to be partly due to the complexity of the game's instructions and its gameplay mechanics.

Bushnell and Dabney formed Atari, Inc., in June 1972 (Dabney left the company in 1973), where Bushnell oversaw the creation of Al Alcorn's *PONG* (1972) after being reminded of the tennis games played in college on the PDP-1 computer when he saw a demonstration of a table tennis game prototype for the Magnavox Odyssey. After negotiating with both Bally and Midway to release *PONG*, Bushnell instead decided that Atari should produce the game as the company's first coin-operated arcade game. Following the commercial disappointment of the comparatively complex *Computer Space*, *PONG* instead demonstrated simple gameplay and concise accompanying instructions: "Avoid missing ball for high score." *PONG* proved to be an immediate success, prompting Atari to release several improved variants of the arcade game in subsequent years.

Soon after founding Atari, Bushnell also surreptitiously cofounded Kee Games with neighbor and friend Joseph Keenan. Bushnell actively sought exclusivity contracts with regional distributors for Atari, which legally required distributors to purchase only Atari games. Kee Games was conceived as a way to sign exclusivity contracts with secondary distributors, effectively rebranding and selling Atari games with only minor cosmetic changes. One of Kee's first original games, *Tank!* (1973), proved so successful that it single-handedly rescued Atari from a financial crisis and prompted the merging of Kee Games with Atari in

December 1974, with Keenan as the new president of the company and Bushnell as its chairman.

Bushnell's work at Atari increasingly shifted away from engineering projects to overseeing the corporation, and he pushed the company to expand beyond its coin-operated games. Faced with competition from similar arcade games that were undermining the initially lucrative *PONG,* Bushnell supported several of Atari engineers' proposed development of a home version of the game by transferring the complex design of *PONG* onto a single chip. Demonstrations of this home iteration of *PONG,* which could be connected to television sets, took place at the 1975 New York City Toy Fair but piqued little interest among toy retailers. Bushnell eventually signed an exclusive deal with retail chain Sears, Roebuck, and Co. to produce 150,000 *Home PONG* units to be sold at Sears stores during the 1975 holiday season, securing capital from friend Donald Valentine to finance the production of the units for Sears.

After the exclusivity deal with Sears expired, Atari produced and sold its own version of *Home PONG,* and Bushnell spurred development of the Atari Video Computer System (VCS; later renamed the Atari 2600), a home console that would use interchangeable game cartridges rather than have dedicated (and thus limited) games. To secure sufficient capital for the launch of the VCS, Bushnell sold Atari to Warner Communications in November 1976 for $28 million.

Bushnell's next venture would be a restaurant chain. The first Chuck E. Cheese had been developed in Atari research and opened in the fall of 1976. After the sale of Atari, Warner did not understand the value of a captive arcade chain and sold it to Bushnell. Chuck E. Cheese's Pizza Time Theatre sought to create a family-friendly venue for video games to compete with existing video arcades, which had been negatively portrayed in the media, and to secure a stable commercial space for Atari's products.

While working on a follow-up system to the Atari VCS, Bushnell was forced to leave Atari by Warner executives in 1978 following escalating disagreements about pricing of the VCS and the next generation of machines. During negotiations for the acquisition of Atari, Warner insisted that Bushnell agree to a noncompete clause that would prevent him from working in video game development for seven years; this agreement would remain in effect until 1983.

In 1982, Bushnell left the day-to-day management of Chuck E. Cheese to a restaurant veteran who changed the formula, which caused the restaurants to begin to lose money. Bushnell tried to step back in but was rebuffed by the board, and he resigned in 1983. The following year, Chuck E. Cheese declared bankruptcy and was purchased by rival chain Showbiz Pizza Place.

Following his departure from Atari, Bushnell also started Catalyst Technologies, the first high-tech incubator, which provided technical services and start-up capital to small high-tech businesses. During this time, Catalyst funded and formed fourteen companies and had positive exits in all but three. The companies included Compower, the developer of the switching power supply; Etak, the first automobile navigation system for cars; ByVideo, which had the first online shopping system; Axlon Toys and Games; Timbertech, which ran computer summer camps; I'Ro, cosmetic test systems; Androbot, personal robotics; Cumma, programmable game vending; Magnum Microwave, simple high-speed communications; Octus, unique call control; KadabraScope, which produced digital animation; Digivision, video display chips; CompShop, a chain of computer retailers; and EnerOp, an electronic communication technology company.

Bushnell has founded or served on advisory boards to dozens of game and technology companies, and in 2000, he launched uWink, a business that developed and incorporated touchscreen technologies and games into restaurant spaces, including its own company-owned uWink Bistros. He has founded or worked with other technology companies, including those focused on education, such as BrainRush and Anti-Aging Games. Bushnell has been inducted into the World Video Game Hall of Fame and the Consumer Electronics Association Hall of Fame and continues to work in technology, game, and media development. In April 2010, Bushnell was invited to serve on the board of directors of Atari, bringing the iconic figure back to help guide the future of the revolutionary company he cofounded.

Bushnell was awarded a BAFTA (British Academy of Film and Television Arts) Academy Fellowship in 2009 for his lifetime achievements in the game industry. In 2018, an advisory board for the Game Developers Choice Awards, part of the Game Developers Conference (GDC), announced that Bushnell would be given its annual Pioneer Award. However, the award was quickly rescinded given criticism about Atari's corporate culture and contemporaneous discussions about sexism in the industry. Bushnell issued an apology in which he also expressed his support for the GDC's decision.

Christopher Hanson

See also: Atari

Further Reading

Chafkin, Max. "Nolan Bushnell Is Back in the Game." *Inc.*, April 1, 2009.

Cohen, Scott. *Zap!: The Rise and Fall of Atari*. New York: McGraw, 1984.

D'Anastasio, Cecilia. "Sex, *Pong*, and Pioneers: What Atari Was Really Like, According to Women Who Were There." Kotaku, February 12, 2018. Available at https://kotaku.com/sex-pong-and-pioneers-what-atari-was-really-like-ac-1822930057.

Goldberg, Marty, and Curt Vendel. *Atari Inc.: Business Is Fun*. New York: Syzygy Company Press, 2012.

Herman, Leonard. *Phoenix: The Rise and Fall of Home Videogames*. 3rd ed. Springfield, NJ: Rolenta Press, 2001.

Learmouth, Michael. "No Pain, No Game." *Metro*, September 16, 1999.

Pulcrano, Dan. "Back to the Garage." *Metro*, September 16, 1999.

C

Caillois, Roger (1913–78)

Roger Caillois was a French essayist, poet, literary critic, sociologist, anthropologist, and philosopher. He was a member of the Surrealist movement (1932–34); co-initiator of the Collège de Sociologie in 1938; founder of the journal *Lettres Françaises* in 1941; a senior official of the United Nations Educational, Scientific, and Cultural Organization (UNESCO) in 1948; founder of UNESCO's journal *Diogène* in 1953; and a member of the *Académie Française* in 1971. Through his various works, Caillois has investigated the powers of imagination, poetry, the fantastic, the sacred, and natural science. He is an important figure in game studies because of his book *Man, Play, and Games* (1961; the French edition has an often forgotten subtitle, *Les jeux et les hommes: Le masque et le vertige* [*Mask and Vertigo*] [1958]).

Following the appendix of the second edition of *Man and the Sacred* (1950) titled "Play and the Sacred," in which Caillois criticizes Johan Huizinga's "mentally stimulating" *Homo Ludens: A Study of the Play-Element in Culture* (1938), Caillois's major contributions are twofold. On the one hand, because he finds Huizinga's definition of *play* "at the same time too broad and too narrow," Caillois begins *Man, Play, and Games* by reconsidering the aforementioned definition and giving his own detailed explanation (that will also, in turn, be used and criticized by future theoreticians). For Caillois, *play* is an activity that is essentially defined as follows:

> *Free*: playing is not obligatory; if it were, it would at once lose its attractive and joyous quality as diversion;
> *Separate*: circumscribed within limits of space and time, defined and fixed in advance;
> *Uncertain*: the course of play cannot be determined, nor the result attained beforehand, and some latitude for innovations is left to the player's initiative;
> *Unproductive*: creating neither goods, nor wealth, nor new elements of any kind; and, except for the exchange of property among the players, ending in a situation identical to that prevailing at the beginning of the game;
> *Rule-governed*: under conventions that suspend ordinary laws, and for the moment establish new legislation, which alone counts;
> *Make-believe*: accompanied by a special awareness of a second reality or of a free unreality, as against real life. (Caillois 1961, 9–10)

Those qualities are intended to define "the nature and the largest common denominator of all games." They are "purely formal" and "do not prejudge the content of the games."

On the other hand, Caillois considers Huizinga's study as an inquiry "of the spirit that rules certain kinds of games—those which are competitive." However, for Caillois, there is a multitude and infinite variety of games that possess many characteristics. Therefore, *Man, Play, and Games* comes up with a classification as complete and systematic as possible. Caillois distinguishes four fundamental categories of games: *agôn*, *alea*, *mimicry*, and *ilinx*. The first kind includes all games in which there is always a "question of rivalry," which has for an essential principle the search for equality; *agôn* is the Greek word for competition. For Caillois, "the point of the game is for each player to have his superiority on a given area recognized." This is akin to Huizinga's claim that the agonal dimension is central to any social activity. Chess, contests, and sports in general are examples of *agôn*. The second category consists of games that are based on chance; *alea* is the Latin name for the game of dice. It "signifies and reveals the favor of destiny." Success does not depend on the player; gambling and lotteries are examples of *alea*. The third category refers to games in which the role of simulation and make-believe is predominant; "mimicry" is the English name for *mimetism*. The player temporarily enters a "closed, conventional, and, in certain respects, imaginary universe." He or she can dress up, wear a mask, or play a role. In other words, the player accepts "an illusion (indeed this last word means nothing less than beginning a game; *in-lusio*)." Children's imitation as well as theater and spectacle in general are examples of mimicry. The fourth category consists of games based on the search for vertigo; *ilinx* is the Greek word for "whirlpool." These games consist of an attempt to destroy for a moment the stability of perception and create a kind of voluptuous panic. Swinging, horseback riding, skiing, and tightrope walking are examples of *ilinx*. For Caillois, what makes this classification rational remains the player's psychological attitude in front of and within a game:

> the desire to win by one's merit in regulation competition (*agôn*), the submission to one's will in favor of anxious and passive anticipation of where the wheel will stop (*alea*), the desire to assume a strange personality (*mimicry*), and, finally, the pursuit of vertigo (*ilinx*). In *agôn*, the player relies only upon himself and his utmost efforts; in *alea*, he counts on everything except himself, submitting to the powers that elude him; in *mimicry*, he imagines that he is someone else, and he invents an imaginary universe; in *ilinx*, he gratifies the desire to temporarily destroy his body equilibrium, escape the tyranny of his ordinary perception, and provoke the abdication of conscience. (Caillois 1961, 44)

According to Caillois, the four categories still do not fully cover the universe of games. Within each category, games "can be placed on a continuum between two poles: the *paidia* and the *ludus*." The *paidia* is "an almost indivisible principle, common to diversion, turbulence, free improvisation, and carefree gaiety is dominant. It manifests a kind of uncontrolled fantasy." The *ludus* is "a growing tendency to bind it [this *paidia*] with arbitrary, imperative, and purposely tedious conventions, to oppose it still more by ceaselessly practicing the most embarrassing chicanery upon it, in order to make it more uncertain of attaining its desired effect" (Caillois 1961, 13).

Although the two poles give more precision to the classification, Caillois proposes an expanded theory of games by showing the various relationships between his four categories. The combinations competition-vertigo and chance-simulation cannot be associated because one needs to stay in control to be able to compete and because one needs to decide consciously to make believe; competition-simulation and chance-vertigo are contingent insofar as the player of games of chance is seized by some sort of vertigo and because games of competition are also a spectacle. There are, then, two fundamental relationships: competition-chance (because games cannot exist without rules) and simulation-vertigo (which also presumes a world without rules in which the player constantly improvises).

As Caillois discusses the possible corruption of play, the social function of play, and, following Huizinga, a sociology derived from games, he particularly shows the interdependence of games and culture and tries to diagnose a "civilization in terms of the games that are especially popular there." Broadly, primitive societies are "ruled equally by masks and possession, i.e., by *mimicry* and *ilinx,*" because orderly societies have "fixes and hierarchical privileges in which *agôn* and *alea,* i.e., merit and heredity seem to be the chief complementary elements of the game of living." However, "since *mimicry* and *ilinx* are always tempting man," they are found in the modern world in the form of carnival, amusement park, circus, tightrope, and, of course, video games.

Bernard Perron

See also: Huizinga, Johan

Further Reading

Caillois, Roger. *Man, Play, and Games.* Translated by Meyer Barash. New York: Free Press of Glencoe, [1958] 1961.

Cheng, Joyce. "Mask, Mimicry, Metamorphosis: Roger Caillois, Walter Benjamin and Surrealism in the 1930s." *Modernism/Modernity* 16, no. 1 (January 2009): 61–86.

Call of Duty Series

Call of Duty (2003), a popular first-person shooter (FPS) published by Activision, began one of the most successful and influential video game franchises of the twenty-first century. Along with the *Medal of Honor* and *Battlefield* franchises, *Call of Duty* established real-life military conflicts, specifically the Allied experience during World War II, as a profitable and expansive representational and narrational focus for blockbuster first-person shooters in the early 2000s. Eschewing the fantastical worlds and weaponry of *Half-Life* (1998) and *Halo* (2001), *Call of Duty* instead emphasizes historical accuracy in its representation of the theaters of war, its depiction of individual battles, and the specificity of the weapons through which players interact with the game.

Since the initial release of *Call of Duty* in 2003, Activision has released fifteen primary *Call of Duty* titles for PCs and seventh- and eighth-generation console systems as well as four secondary titles for previous console generations and eight handheld titles; these include multiple sequels to the original release set during World War II as well as stand-alone titles and alternate series that focus on other historical wars, clandestine military operations, and contemporary and futuristic military combat. Over time, the series has both shaped and responded to market forces and consumer demands, most notable in the franchise's increased focus on cooperative and competitive multiplayer and zombie modes and a shift away from narrative campaigns.

As an FPS, *Call of Duty* presents the battlefield, the individual level that is the space of ensuing play, from the point-of-view of a soldier the player embodies, whose presence is announced by the weapon carried and the sights he or she aims down. While pushing forward through the battlefield, the player, frequently accompanied by non-player characters that are part of the player's military unit, is beset by foes that must be eliminated routinely and repeatedly with bullets, grenades, or various bludgeons. Strategy involves knowing when and how to attack and when to duck and cover, and it employs a trial-and-error methodology, as players, upon dying in-game, respawn from spatially proximate points that precede the challenges that overwhelmed them.

As the series has progressed, designers have made both minor and major changes to gameplay. For example, the original *Call of Duty* (2003), *Call of Duty 2: Big Red One* (2005), and the recent *Call of Duty: WWII* (2017) require the player to pick up health packs to heal after being wounded, whereas all other games in the franchise feature automatic health regeneration; *Call of Duty 2* (2005) established an indicator system that notifies the player of the proximity of potentially lethal explosives, and *Call of Duty: Black Ops III* (2015) allows players to toggle on a visual overlay that displays locations of enemies, dangerous areas, and incoming projectiles. More recent *Call of Duty* titles allow players to carefully and minutely edit their loadouts, the weapons they carry into battle, before goal-oriented play begins. While these changes alter the experience of gameplay, *Call of Duty* has remained markedly consistent over a fifteen-year period, emphasizing the domination of a discrete space that unfolds in front of the player from a first-person perspective through violent means to establish a military victory.

The original *Call of Duty* and its immediate sequels represent World War II as a multifaceted, international war effort waged by the Allies against the Axis powers on numerous fronts. While the design of these games is fundamentally linear, with individual levels generally featuring only a single clear path from beginning to end, representing an ever-deeper push into enemy territory, the series' approach to the temporality and spatiality of World War II has been neither linear nor chronological. In the original *Call of Duty*, the player plays alternately as an American private, a British sergeant, and a Soviet corporal; the first mission in the game takes place during the Battle of Normandy in 1944 from an American's perspective, and a later mission takes place during the Battle of Stalingrad in 1942 from a Soviet's perspective. As the game progresses, the soldier the player inhabits and the World War II theater represented repeatedly change.

This fluidity in the representational time and space of play has been a hallmark of *Call of Duty*, with the initial World War II–era sequels, *Call of Duty 2*, *Call of Duty 3* (2006), and *Call of Duty: World at War* (2008), as well as the

Modern Warfare games, which represent contemporary, quasi-fictionalized battlefields, requiring the player to inhabit multiple characters all working toward a similar militaristic goal on different fronts. The first two *Black Ops* titles take this temporal and spatial fluidity to an extreme. The first *Black Ops* (2010) is structured as a series of interconnected flashbacks of one CIA operative during various moments of the Cold War, including his attempted assassination of Fidel Castro in Cuba in 1961, during the Bay of Pigs, and his defense of Khe Sanh, in Vietnam, in 1968. Temporal dislocation is emphasized even more in *Black Ops II* (2012), which transitions between the Cold War of the mid-1980s and a future Cold War of the mid-2020s, where players play respectively as father and son, fighting through various clandestine missions when they are not briefly inhabiting Manuel Noriega. However, as the franchise has in recent years increasingly moved into the realm of science fiction, with *Advanced Warfare* (2014) depicting the rise of private military organizations in the mid-2050s, *Black Ops III* representing the growth of networked cyberwarfare in the mid-2060s, and *Infinite Warfare* (2016) envisioning a war between Earth and Mars colonists in the far future, the missions, while they transition rapidly between multiple locations, are presented chronologically and from a single individual's perspective. *Call of Duty: WWII* (2017) retains this singular, chronological perspective while returning the game to the historical conflict that was the initial focus of the franchise.

Those games that do take place during World War II take great pains to overtly declare the historical accuracy and fidelity of the information they provide and emphasize the realism of player experience. In the first *Call of Duty*, the use of "iron sights," in which a brief animation occurs as players depress a button that causes their point of view to literally look down the barrel of their gun and then use alignment markers for better aim and higher accuracy, provides a penchant for realism absent in FPSs that simply utilize an on-screen crosshair. Additionally, the weapons themselves are visual and aural replicas of actual military hardware used during World War II (much as the weapons in the *Modern Warfare* series are replicas of contemporary weaponry).

The World War II games also make use of highly detailed descriptions of actual missions, explained in voice-over—such as Operation Overlord in *Call of Duty* or the raid on Makin Island in *Call of Duty: World at War*—combined with statistics, comprehensive maps, archival photographs, and grainy film footage from the period to emphasize verisimilitude. The credits of these games prominently denote the historians, scholars, and veterans consulted during the games' design.

Although the developers' attempts to replicate the look and feel of warfare have vastly improved throughout the franchise, as its popularity has grown, *Call of Duty* increasingly engages Hollywood tropes and production values. This includes making direct references to Hollywood films; for example, a mission in which the player must defend an American suburb in *Modern Warfare 2* is titled "Wolverines," an overt reference to John Milius's film *Red Dawn* (1984), in which a group of teenage students use their high school mascot, a wolverine, as a rallying cry while defending their town from invading Russian and Cuban troops. More notably, an impressive roster of movie stars has lent their voices and frequently their likenesses to *Call of Duty* games, including Kiefer Sutherland and Gary Oldman in *World at War*, Ice Cube and Sam Worthington in *Black Ops*, and

Kevin Spacey in *Advanced Warfare*, among many others. The performances of these actors, which are far more than mere cameos, lend Hollywood star power to the franchise while also clearly displaying the fluidity between mediums present in the modern era. Indeed, the franchise's cutscene sequences, the most obvious referent to cinema's unique form of signification, grow increasingly elaborate with each title; the photo-realism present in *Call of Duty: WWII* combined with the recognizable faces and voices of actors Josh Duhamel and Jonathan Tucker blur the distinction between in-game cinematic and Hollywood film. Worthington, Cara Delevingne, Kobe Bryant, Megan Fox, Jonah Hill, and others have also appeared in live-action commercials for the franchise, particularly promoting cooperative and competitive multiplayer modes.

While narrative campaigns in *Call of Duty* have grown increasingly complex, detailed, cinematic, and fantastical, the breadth of available multiplayer modes have also expanded significantly. *Call of Duty 2* features Deathmatch, Capture the Flag, Search & Destroy, and Headquarters, all multiplayer modes common at the time of release, played out in arenas based on campaign levels; however, later games have introduced new approaches that have garnered their own expansion packs and become selling points for the franchise. *Call of Duty: World at War* prominently introduced a zombie mode in which players must continually barricade a limited area while fending off wave after wave of increasingly overwhelming undead; additional zombie maps were released as downloadable content for the game, and all subsequent *Call of Duty* games, except for *Modern Warfare 2* and *3* and *Call of Duty: Ghosts* (2013), have featured zombie maps distinct from normal multiplayer modes. Instead, *Modern Warfare 2* features Spec Ops missions, which are not part of the narrative campaign but are based on its levels, presenting the player with focused challenges of variable difficulties that frequently occur under time constraints, and *Modern Warfare 3* features a Survival mode in which players fight waves of enemies that spawn in tactically challenging places determined by player location. Both Spec Ops and Survival modes can be played solo or cooperatively.

These unique modes of play change along with the individual game's mechanics, as in *Advanced Warfare*, where the campaign's powerful exoskeleton suit, which allows for increased speed and the ability to propel oneself through the air after jumping, appears in the game's Exo Survival and Exo Zombies modes. Traditional multiplayer modes have also expanded; *Black Ops II* introduced a Pick 10 system in which players design their own classes of soldier, outfitting them with ten weapon accoutrements or special abilities, and *Infinite Warfare* allows for the choice of Specialists, soldiers with unique weapons and skills. Point tracking has also been increasingly refined, as Killstreaks, the number of enemies a player dispatches before they die; Scorestreaks, the assessment of points accrued while attempting to attain a goal; and other registers combine to increase the players' experience points, or XP, which in turn allows them to create more powerful avatars.

In recent releases, the distinctions between different modes of play have increasingly blurred. *Black Ops III*'s main campaign features a nightmarish segment that operates by the mechanics of the franchise's zombie mode, as the player must defend an immolating two-story structure from waves of burning undead. Once the campaign is complete, it can be replayed in Nightmares mode, which features the same levels but a different narrative, with the player primarily fighting against the undead instead of soldiers and machines. Recent releases feature zombie modes with increasingly complex and outlandish narratives, as in *Infinite Warfare*, which manages to lampoon Hollywood B-movie horror film production, the television show *Knight Rider* (1982–86), interdimensional travel, and demonism, with performances by David Hasselhoff, Pam Grier, and Kevin Smith, among others. The decreased emphasis on a singular main narrative is profoundly evident in the recent *Call of Duty: Black Ops 4* (2018), which does not feature a dedicated single-player campaign. Instead, in addition to traditional multiplayer modes, the game features a battle royal Blackout mode, where up to a hundred players compete against one another, either alone, in pairs, or in groups of four, attempting to scavenge loot and survive while the playable space, initially the largest map in any *Call of Duty* game, continually contracts. Blackout has its own complex narrative and individual backstories for playable characters, related to events in the campaigns of previous *Black Ops* titles, entwining multiplayer freneticism with a complex and unique storyline and blurring the boundaries between previously distinct modes of play.

As a shooter, *Call of Duty* has an industrial and technological history that precedes the release of the initial game in 2003. The team that formed Infinity Ward, founded in 2002 by Vince Zampella and Grant Collier with Jason West, had previously developed *Medal of Honor: Allied Assault* (2002) for 2015 Inc. and publisher Electronic Arts and designed *Call of Duty* using the id Tech 3 engine, originally created for *Quake III Arena* (1999). (As developers modified this engine while designing sequels, it has become increasingly proprietary; dubbed the IW engine, it has gone through multiple iterations.) Previously owning 30 percent of Infinity Ward, Activision bought the remaining 70 percent after the original game's release. Although Infinity Ward would design the immediate sequel, the *Modern Warfare* series, and other stand-alone titles, other developers, initially Treyarch and later Sledgehammer Games, were recruited so that Activision could release annual iterations of the franchise. *Call of Duty* has become one of Activision's flagship properties, with the publisher declaring as early as 2009 that the franchise had yielded profits in excess of $3 billion. As Activision does not directly release sales figures, current analyses, which consider the sale of expansion packs, presales that proffer special in-game weaponry, and rereleases such as *Call of Duty: Modern Warfare Remastered* (2016), estimate the franchise has netted in excess of $16 billion.

Nonetheless, rifts between Infinity Ward's leaders and Activision eventually led to a legal imbroglio lasting from 2010 until 2012 in which Infinity Ward heads Zampella and West were fired for insubordination and Activision sued competitor Electronic Arts for corporate malfeasance. These lawsuits were reported through both video game websites and major news organizations, but the turmoil did not affect the franchise's success; *Call of Duty: Modern Warfare 2* (2009), Infinity Ward's release prior to the shakeup, would go on to sell over fourteen million copies worldwide and retail over 2.5 million expansion packs online. As such, the franchise also exemplifies how video games are copyrighted properties whose ownership and oversight can be the subject of intensive and costly litigation.

Recently, Activision has been roundly criticized for its treatment of employees while posting record profits due, in part, to *Call of Duty*'s success. While *Blacks Ops 4* netted in excess of $500 million during its first three days of release, contributing to what Activision termed a "record year" in which it made $7.5 billion in sales and $1.8 billion in profit, eight hundred employees were fired on February 12, 2019, spurring calls for unionization among game designers, technicians, marketers, and support staff.

Harrison Gish

See also: *West and Zampella v. Activision*

Further Reading

Garrelts, Nate, ed. *Responding to Call of Duty: Critical Essays on the Game Franchise*. Jefferson, NC: McFarland & Company, Inc., Publishers, 2017.

Huntemann, Nina B., and Matthew Thomas Payne, eds. *Joystick Soldiers: The Politics of Play in Military Video Games*. New York: Routledge, 2010.

Ouellette, Marc A., and Jason C. Thompson. *The Post-9/11 Video Game: A Critical Examination*. Jefferson, NC: McFarland & Company, Inc., Publishers, 2017.

Payne, Matthew Thomas. *Playing War: Military Video Games after 9/11*. New York and London: New York University Press, 2016.

Canada

From the beginning of the video game industry to the North American industry crash of 1983, Canadian players bought American products from Atari, Mattel, and Coleco, and everything played in the country was made by Canada's southern neighbor. The history of Canadian video game production began in 1983 with a game called *Evolution*, which was created by two Vancouver teenagers, Don Mattrick and Jeff Sember, who designed a player experience tracing the natural evolution from the first life forms to the appearance of the human race. Published by Sydney Development Corporation for PCs, the game sold more than four hundred thousand copies. Proud of their success, the two creators founded a company in British Columbia called Distinctive Software in the 1980s and hired sixty employees, a size unheard of at that time. That same year, in Ottawa, Ontario, Rick Banks and Paul Butler of Artech Digital Entertainment Studio created *B.C.'s Quest for Tires* (1983), a game in which the caveman player character must rescue his girlfriend, who has been kidnapped by a dinosaur. The next year, the sequel, *Grog's Revenge* (1984), was released.

In 1991, Electronic Arts (EA) bought Distinctive Software and rebranded the studio EA Canada. The industry grew significantly when employees left the company to begin third-party studios, such as Radical Entertainment (*Prototype* [2009]), Relic Entertainment (*Company of Heroes* [2006]), Barking Dog (Rockstar Vancouver), and Black Box Games (acquired by EA in 2002). These acquisitions by EA in the 1990s and the 2000s created the biggest production capacity in Vancouver and subsequently in Canada and in the world at the time. Among their base of operations are EA Montreal and EA Edmonton, also known as Bioware.

Before becoming a subsidiary of EA, Bioware was formed in 1995 in Edmonton, Alberta, by Ray Muzyka, Greg Zeschuk, and Augustine Yip. Specializing in role-playing games (RPGs) for the PC market, Bioware became one of the most praised companies in the Western world in the early 2000s. Its success with the *Baldur's Gate* and *Neverwinter Nights* franchises and games, including *Star Wars: Knights of the Old Republic* (2003) and *Mass Effect* (2007), are among the most celebrated RPGs in the world and have become a reference point for many creators.

At the turn of the century, while EA's Vancouver Studio was the largest center of production in Canada, the second largest, more than twenty-nine hundred miles away, was Montreal with the presence of EA, Eidos, Warner Bros., and especially Ubisoft. In 1997, the Quebec government, with a lot of subsidies, convinced the French company to open a big studio in the province. After a slow start, less than ten years later, Ubisoft Montreal was the biggest studio in the country and one of the most productive in the world. Thanks to franchises such as *Splinter Cell*, *Prince of Persia*, *Just Dance*, and *Assassin's Creed*, the studio acquired both revenues and credibility. The province of Quebec is also a great leader in independent games. Formed in 2016, the Québec Independent Developers' Guild is a cooperative structure that gives political power and resources to hundreds of studios in the province. As of late 2017, there were 596 active studios, a number that will only increase as the industry continues to prosper in Canada, adding CAD 3.7 billion annually to the country's gross state product.

Canadian video game history is not limited to its production capacity and its titles. Technological innovation and creative savvy play a role in this explosion as well; in 2005, Syd Bolton opened the Personal Computer Museum in Brantford, Ontario, to document and conserve the history and the present state of the video game industry in the world and especially in Canada.

Louis-Martin Guay

See also: Electronic Arts; Ubisoft

Further Reading

Arsenault, Dominic, and Louis-Martin Guay. "Canada." In *Video Games around the World,* edited by Mark J. P. Wolf, 105–118. Cambridge, MA: MIT Press, 2015.

Donovan, Tristan. *Replay: The History of Video Games*. East Sussex, UK: Yellow Ant Media, 2010.

Entertainment Software Association in Canada. *Essential Facts about the Canadian Video Game Industry 2018*. Available at http://theesa.ca/wp-content/uploads/2018/10/ESAC18_BookletEN.pdf.

Paul, Leonard J. "*Canadian Content in Video Games*." DIGRA 2005. Available at http://www.digra.org/dl/db/06276.50521.pdf.

The Personal Computer Museum website. Available at http://pcmuseum.ca/.

Candy Crush Saga

King's *Candy Crush Saga* (2012) is a free-to-play, match-three-style game originally released for Facebook and now available on a range of platforms, including PC, mobile phones, and tablets. It was originally structured around the social network game (SNG) progression model that requires players to ask members of their social network to give them "tickets" to move to the next section of levels, request extra lives, or give lives to other players on their friends list.

6
Target: 300

***Candy Crush Saga* is a puzzle game that can be played on a mobile phone with a touchscreen. (Vladimir Stanišic´/Dreamstime.com)**

Several spin-offs have since been released, including *Candy Crush Soda Saga* (2014), *Candy Crush Jelly Saga* (2015), and *Candy Crush Friends Saga* (2018). All versions can be played online or off-line, and progress can be synchronized across platforms if connected through Facebook. *Candy Crush Saga* and its spin-offs offer "freemium" gameplay; players can play for free, but they can also purchase in-game boosts, extra lives, and extended gameplay time, each costing a small fee.

Candy Crush's gameplay centers on matching different candies in lines of three, four, or five to clear level objectives, with different combinations rewarding the player with an in-game boost. Each level has its own set of objectives, such as collecting a certain number of candies or reaching a set score within a time limit. Players must successfully meet these objectives while overcoming a range of obstacles, such as spreading chocolate or licorice webs that trap candies, among many others, to complete each level. Players have five lives that regenerate every thirty minutes, and they can accumulate extra lives, power-ups, and bonuses in different ways, including asking friends in their network who play the game, daily free spins, and purchasing items for real-world currency.

With its accessible and sociable gameplay, *Candy Crush Saga* is one of the most successful freemium franchises (Minotti 2019) and draws in a wide range of players (Amaro, Veloso, and Oliveira 2016).

Kelly Boudreau

See also: Casual Games

Further Reading

Amaro, A. C., A. I. Veloso, and L. Oliveira. "Social Games and Different Generations: A Heuristic Evaluation of Candy Crush Saga." In *2016 1st International Conference on Technology and Innovation in Sports, Health and Wellbeing (TISHW)*, IEEE, December 1–3, 2016: 1–8. Available at https://ieeexplore.ieee.org/document/7847791.

Guala, L., S. Leucci, and E. Natale. "Bejeweled, Candy Crush and Other Match-Three Games Are (NP-) Hard." In *2014 IEEE Conference on Computational Intelligence and Games*, IEEE, March 24, 2014: 1–8. Available at https://arxiv.org/abs/1403.5830.

Minotti, M. "Sensor Tower: Candy Crush Players Spent an Average of $4.2 Million a Day in 2018." VentureBeat, January 09, 2019. Available at https://venturebeat.com/2019/01/09/sensor-tower-candy-crush-players-spent-an-average-of-4-2-million-a-day-in-2018/.

Willson, M., and T. Leaver, eds. *Social, Casual and Mobile Games: The Changing Gaming Landscape*. London: Bloomsbury Publishing, 2017.

Capcom

Capcom is a Japanese video game developer and publisher with significant franchises in both the home console games market and arcade games. It was officially founded in 1983 to take over Osaka-based Sambi Co.'s internal sales department. The company's series helped establish (and continue to dominate) a number of major genres: run-and-gun shooting games (the *Mega Man* series), hack-and-slash games (the *Devil May Cry* series), fighting games (the *Street Fighter* series), and survival horror games (the *Resident Evil* series). Capcom is primarily known as a purveyor of highly skill-based video games that appeal to hard-core gamers.

Despite a focus on shooting games for the company's first titles in 1984 and 1985, Capcom quickly established a number of run-and-gun franchises that spawned decades of sequels. The arcade game *Ghosts 'n Goblins* (1985) maintains notoriety as one of the most difficult games of all time. It follows a knight, Arthur, who collects armor power-ups and alternate weapons to battle the undead on a quest to save a princess. Arthur dies after two hits or when a fairly short timer reaches zero. Capcom's *Mega Man* (1987), for the Nintendo Entertainment System (NES), ushered in the conventions of nonlinear level selection and selectable weapon modes derived from completed boss battles.

As a third-party developer, Capcom was instrumental in the success of the Super Nintendo Entertainment System (SNES). The console release of *Street Fighter II* (1991), an SNES exclusive and first third-party hit for Capcom, sold more than two million copies, and with an estimated sixty thousand arcade machines sold worldwide, *Street Fighter II* also reinvigorated U.S. arcades (Kent 2001, 446). Designed by Capcom's own Yoshiki Okamoto, *Street Fighter II*'s keys to success were its skill-based "secret" moves and wide selection of playable characters, each with its own strengths, weaknesses, styles, and movesets (Donovan 2010, 221). The *Street Fighter* franchise also standardized the six-button controller layout used in most contemporary fighting games. Iterated on and graphically retouched countless times, *Street Fighter II* remains a staple of competitive gaming.

Capcom titles continue to fuel the growing professional fighting game community. At the 2010 Evolution Championship Series (EVO), the largest and longest-running fighting game event in the world, four out of the six featured tournaments were for Capcom games: *Super Street Fighter IV* (2010), *Tatsunoko v. Capcom* (2008), *Super Street Fighter II HD Remix* (2008), and *Marvel v. Capcom 2* (2000). Capcom also supports professional gaming through funding, advertising, and broadcasting partnerships.

In the mid-1990s, Capcom's *Resident Evil* franchise successfully translated the cinematic tropes of the Romero-style zombie film into low-polygon resolution three-dimensional graphics (Donovan 2010, 275). The game reveled in moody atmosphere, awkward camera angles, limited ammunition, and surprise attacks from slow-moving but inexorable enemies. Capcom again shifted the direction of the horror genre in 2005 when *Resident Evil 4* introduced a more action-oriented approach to zombie survival, with a focus on faster enemies and crowd dynamics, leading the way for popular titles such as Capcom's own *Dead Rising* (2006) and Valve's *Left 4 Dead* (2008) (Donovan 2010, 277). Despite justified criticism of its portrayal of African people as violent savages, *Resident Evil 5* (2009) became one of the best-selling games of the franchise. Since then, *Resident Evil 6* (2012) and *Resident Evil 7* (2017) have been released and the *Resident Evil 7: Biohazard Collector's Edition*, which comes with a model house.

Simon Ferrari

See also: Fighting Games; *Resident Evil* Series; Survival Horror Games

Further Reading

Donovan, Tristan. *Replay: The History of Video Games*. East Sussex, UK: Yellow Ant Media, 2010.

Evolution Championship Series website, 2010, Available at http://evo.shoryuken.com/.

John, Tracey. "Newsweek's N'Gai Croal on the 'Resident Evil 5' Trailer: 'This Imagery Has a History.'" MTV Multiplayer, April 10, 2008. Available at http://www.mtv.com/news/2456617/newsweeks-ngai-croal-on-the-resident-evil-5-trailer-this-imagery-has-a-history/?

Kent, Steven. *The Ultimate History of Video Games*. New York: Three Rivers Press, 2001.

Capcom USA v. Data East

The arcade version of Capcom's fighting game *Street Fighter II* (1991) was a huge success with numerous follow-ups and ports to various home consoles. Data East released its own fighting game, *Fighter's History*, in 1993, and Capcom sued shortly after, alleging that Data East had copied *Street Fighter II*. However, Data East was confident that it would win the case because it had once sued a company for copying one of its games and lost (see ***Data East USA v. Epyx***).

In *Capcom USA v. Data East*, "Capcom allege[d] that Data East's Fighter's History copies the distinctive fighting styles, appearances, special moves and combination attacks of many of Street Fighter II's characters, as well as the control sequences used to execute their moves" (*Capcom USA, Inc. vs. Data East Corp.* 1994). Data East admitted to attempting to make a game similar to *Street Fighter II* but also argued that they had consulted numerous other sources. Any similarity between *Street Fighter II* and *Fighter's History*, Data East argued, was because both games "use[d] the same format and [drew] from the same public domain of stereotyped characters, not because Data East copied Capcom" (*Capcom USA, Inc. vs. Data East Corp.* 1994). However, as the judge wrote in his verdict, he did not find Data East's argument persuasive and found that the main inspiration for *Fighter's History* was, indeed, *Street Fighter II*.

Despite this setback, the judge ruled that "[c]opying alone . . . is not sufficient to state a claim in copyright if the elements copied are not protectable. . . . Capcom must further establish that Fighter's History is substantially similar to Street Fighter II and that the similarity results from protectable expression" (*Capcom USA, Inc. vs. Data East Corp.* 1994). At this point, as with *Data East USA v. Epyx*, the issue became *which* elements of *Fighter's History* were common to the fighting game genre and which, if any, were unique to *Street Fighter II*. To this end, the judge looked at "four primary categories: (1) similarities in characters; (2) similarities in special moves and combination attacks; (3) similarities in control sequences; and (4) miscellaneous similarities in the general presentation and flow of the games" (*Capcom USA, Inc. vs. Data East Corp.* 1994). After going through each category, the judge found that most of the elements in these four categories were, indeed, common to the genre. Although *Fighter's History* did use a small number of characters and special moves from *Street Fighter II*, there were not enough of them to declare *Fighter's History* as infringing on Capcom's copyright. The case was dismissed. Thus, the case affirmed the right of companies to make games in the same genre as other games and denied companies from legally gaining a monopoly on a broad genre of game, which would stifle creativity (Leone 2014).

Bryan-Mitchell Young

See also: Capcom

Further Reading

Capcom USA, Inc. vs. Data East Corp., 1751482 Westlaw (Northern California US District Court 1994).

Kohler, C. "The Fighting Game Capcom Tried to Get Pulled from Arcades." Kotaku, January 3, 2019. Available at https://kotaku.com/the-fighting-game-capcom-tried-to-get-pulled-from-arcad-1831460432.

Kunkel, B. "My Three Trials: Part Three: Capcom v. Data East." GoodDealGames.com, 2003. Available at http://www.gooddealgames.com/articles/Three_Trials_Part_3.html.

Leone, M. "Street Fighter 2: An Oral History." Polygon, February 3, 2014. Available at http://www.polygon.com/a/street-fighter-2-oral-history.

Careers

Video game industry careers are often situated along one of several tracks, including the roles of game designer, software programmer, artist, animator, quality assurance tester, marketing specialist, and producer. Companies that produce game consoles also use hardware engineers for the design and manufacture of video game systems.

Game designers are responsible for creating a game's fictional scenario as well as for establishing the rules and mechanics and tuning and adjusting these rule systems to optimize gameplay. In strategy games, for example, a game designer may be responsible for designing the basic layout of maps for the game's world, setting and adjusting the values and attributes for each game element and establishing the relationships between elements. After creating the main aspects of gameplay mechanics, designers focus on building levels, writing the game's backstory, and balancing aspects of gameplay. Some designers specialize in specific aspects of a game's design; for example, several level designers may work under a lead designer, with each building the layouts and maps of different parts of a game.

Software programmers often come from a computer science background and are responsible for the construction of the software frameworks and game engines upon which games run. The design and implementation of such software systems is often divided among programmers, who are often broken up into teams based around specific elements of the game; for instance, one or more programmers may be tasked with building the three-dimensional graphics engine for a game, while others may focus on the software code that handles the network and multiplayer capabilities of a game. Programmers also build the software tools used by other people involved in the production of the game, such as the map-building and scripting tools that are used by the designers to construct the rudimentary elements of the game.

Artists design the visual and aural aspects of the game, crafting the appearance of characters and other elements in the game. After the basic gameplay mechanics, map layouts, and game elements have been established by the game's designers, artists will shape a game's aesthetic appearance. Artists conceive of the appearance and tone of a game, such as creating conceptual sketches of characters and levels for the game, and will shape elements such as lighting and sound effects. Animators draw and design character movement and other aspects of motion in the game using both traditional and digital techniques to create frame-by-frame relationships for movement. Animators also employ motion-capture systems to digitally record the movements of people or other objects to translate the data into realistic motion animations within the game.

Game testers, also known as quality assurance (QA) testers, are tasked with verifying game functionality, checking for software bugs and gameplay balance, and ensuring the proper behavior of game features. QA plays a key role in the development of games to ensure that the games work as designed and are enjoyable experiences for the player. Some game companies will outsource QA work to other companies that specialize in software testing.

Marketing and public relations specialists help promote games and the companies that produce them, working with websites, magazines, television shows, and other media outlets and using advertising and other means to garner the attention of game players and the game press.

Game producers manage the creation of games, coordinating the schedules of the different people and teams described above to help them work together to produce the game. Given the large numbers of people and enormous budgets required to make a game (particularly the more visually complex ones), producers are necessary to help organize and coordinate a game's development.

Hardware engineers are more common at companies that produce video game arcade or console hardware, such as Nintendo, Namco, Sony, or Microsoft, and are typically trained in electronics and circuit design. Engineers design the physical aspects of video game systems, including the specifications for the console's processors, controllers, and interfaces, such as game pads, and highly specialized components, such as graphics chips.

At smaller companies, the responsibilities of multiple positions may be shared by several individuals; for instance, a programmer may also function as the game's producer and artist. At larger companies that are producing multiple games simultaneously, groups of individuals may be assigned to work as a team for one game or for one specific aspect of the development of multiple games (e.g., a larger company may use a testing/QA department that is responsible for bug checking for all of the company's games in development rather than just one).

Professional experience in game development is often valued when game companies are hiring, but specialized skills for the many specific jobs are equally important. For instance, artists and animators often have creative experience and training, and game producers and marketers may have a managerial or business background. An increasing number of colleges, universities, and other educational programs offer game design and development courses and degrees at the undergraduate and graduate levels. Game distribution platforms such as Valve's Steam and Nintendo Switch Online have allowed independent game creators to release their games to large audiences, permitting small teams or even individuals to bypass the restrictive established structures of game publishing and distribution customary to physical media. However, even in the case of smaller independent teams, game development tasks are often assigned to the particular skill sets of team members.

Careers in video games also extend beyond the production and marketing of games, and several other professions involve direct work with video games. Game reviewers and critics assess the quality and value of specific game titles, and video game journalists cover the game industry for magazines, newspapers, television, and digital publications. Scholars in media studies and video game studies research the history, theory, and social and cultural aspects of video game production, and some also teach courses at colleges and universities.

The rapid growth of esports and livestreaming platforms such as Twitch have allowed a growing number of professional game players to earn income and sponsorship for playing video games for online viewers or competitively in esports events and tournaments. Some esports organizations, tournaments, and leagues include Major League Gaming, ESL (formerly Electronic Sports League), the Overwatch League, the Evolution Championship Series for fighting games, the League of Legends World Championship, and the International tournament for Valve's multiplayer online battle arena game *Dota 2* (2013). Other careers associated with esports include sports commentators (sometimes called *shoutcasters*), coaches, marketing, promotion, and positions in league administration and management.

Christopher Hanson

See also: Game Design; Industry

Further Reading

Adams, Ernest. *Break into the Game Industry: How to Get a Job Making Video Games*. Berkeley, CA: McGraw-Hill Osborne, 2003.

Game Career Guide website. Accessed September 6, 2020. Available at http://www.gamecareerguide.com.

International Game Developer Association. "Job Search Resource Center." Accessed September 6, 2020. Available at https://careers.igda.org/career-resources/.

Moore, Michael E., and Jeannie Novak. *Game Development Essentials: Game Industry Career Guide*. 3rd ed. New York: Delmar/Cengage Learning, 2011.

Rabin, Steve, ed. *Introduction to Game Development*. 2nd ed. Boston, MA: Charles River Media, 2009.

Ruggill, Judd Ethan, Ken McAllister, Randall J. Nichols, and Ryan Kaufman. *Inside the Video Game Industry: Game Developers Talk about the Business of Play*. New

York: Routledge, 2017.

Cartridges

A cartridge is a sealed box that contains a read-only memory (ROM) chip, usually consisting of the data of only one game (or set of variations on a game) designed for a specific console. One part of the box contains a connector, which has to be connected to the circuits of the corresponding console through a slot. When the cartridge is inserted in this slot, the console can be powered on, and the game is ready to be played.

In 1974, Alpex Computer Corporation patented the main principle of game cartridges: data stored on ROM chips that allow players to switch easily from one game to another. Its home console system, the Fairchild Channel F, released in 1976, was the first to introduce real cartridges. The Magnavox Odyssey, released in 1972, had already employed a similar mechanism; a user had to physically change a plastic part of the console to play a chosen game. However, technically, every game was already embedded in the Odyssey: the cartridge only contained wires to connect existing circuits, thus selecting which properties were needed to play the game. Instead of being embedded in the cartridge as read-only memory, the game was generated by properties already programmed in the console circuits.

All consoles in the first half of the 1970s were “dedicated” consoles, which means they offered a small number of playable games that were directly hardwired into their circuitry. With the introduction of cartridges, customers would no longer have to buy a new console for each new game they wanted to play; they could buy new games in cartridge form and play them on the same console system. Although cartridges were all initially read-only, some Nintendo Entertainment System (NES) cartridges, using a new technology, could write basic data such as game states. Even though Alpex Computer Corporation undertook legal actions to receive monetary compensation following the proliferation of its patented mechanism, cartridges became a standard in the industry and remained the principal home video game format for around twenty years, and they are still the standard for handheld consoles.

The introduction of cartridges had a major impact on the industry. Cartridges allowed for the production of games by third-party developers: they could develop games on an existing system instead of creating their own, reducing the cost of the game itself and minimizing the risk of a commercial failure. The Atari VCS 2600 console took advantage of third-party contributions, resulting in a large number of games being available, but this became a factor that led to the video game industry crash of 1983, as too many bad games glutted the market. When Nintendo introduced the Nintendo Entertainment System (NES), it still allowed third-party developers to release games for its console, but Nintendo maintained tighter control over licensing than Atari had.

An assortment of classic retro video game cartridges, systems, and controllers. (Robtek/Dreamstime.com)

Cartridges were eventually replaced by CD-ROM technology, which contained far more memory than a cartridge. The first CD-ROM drive for a home console system became available for the NEC PC-Engine/Turbografx-16 released in 1989, and the first home computer game to appear on CD-ROM was Cyan's *The Manhole* (1987). The late 1980s and early 1990s were a period of coexistence of both formats: the SEGA CD and the 3DO Interactive Multiplayer consoles used CD-ROMs, whereas the Super Nintendo Entertainment System (SNES) and SEGA Mega Drive were cartridge-based systems.

Nintendo still used cartridges for its Nintendo 64 console released in 1996. At the time, even though the CD-ROM seemed to be the next-generation support medium—carrying approximately 320 times more data—cartridges had technological advantages that could not be ignored. First, CD-ROM games were slowed by a loading time in between gaming sequences; however, cartridges were significantly faster than discs, and games were ready to play as soon as they were plugged into the console. Cartridges were designed to work with only one system, which raised the cost of each unit produced but allowed the Nintendo 64 to be protected from the piracy problem that the Sony PlayStation console was experiencing. Furthermore, because a cartridge is directly connected to the console's internal wires, cartridge-based consoles do not use internal memory to load data, reducing the cost of the machine itself. Additional hardware elements could be added that way to adapt to specific demands of a game: for example, *Star Fox* (1993), for the SNES, included a coprocessor in the cartridge to support three-dimensional graphics.

The invention of the cartridge separated game and console development in the industry, leading to an increase in game offerings. It also made user-friendly game-switching hardware a widespread phenomenon that was the main game selection system with home consoles for almost three decades. In 2017, cartridges have made a return with the hybrid home-handheld console Nintendo Switch, and so they may continue to evolve.

Simon Dor

See also: Generations of Technology

Further Reading

Kent, Steven L. *The Ultimate History of Video Games: From Pong to Pokémon and Beyond*. New York: Three Rivers Press, 2001.

Sheff, David. *Game Over: How Nintendo Zapped an American Industry, Captured Your Dollars, and Enslaved Your Children*. New York: Random House, 1993.

Wolf, Mark J. P., ed. *The Video Game Explosion: A History from PONG to PlayStation and Beyond*. Westport, CT: Greenwood Press, 2007.

Casual Games

There are several ways to approach and define what casual games are and what they do, though none of them are definitive. Typically, the prime characteristic of casual games is that they are considered easy, making them thereby suitable as a casual pastime rather than for long and immersive gameplay experiences. However, many classic board games and puzzle games are also generally categorized under casual games, even though these games can be rather difficult and complex at more advanced levels of play. According to a popular maxim, casual games are "easy to learn, difficult to master." Thus, not all games that are considered casual necessarily lead to play styles that are casual or laidback. Consequently, it is important to differentiate between casual games, people who prefer to play these games, and the play style involved.

The concept of casual games was originally intended for marketing purposes, and these games continue to be an important business area. The IGDA's "2008–2009 Casual Games White Paper" refers to the traditional labeling of casual games as "games for the rest of us" and states that casual games are typically designed and marketed in a neutral, inclusive manner, hopefully attracting people of all ages and genders. Some casual game providers have claimed that the majority of their customers are female; in 2006, a customer survey published by PopCap Games (today part of Electronic Arts), one of the leading developers and publishers of casual games, claimed that "76% of casual game players are female, with an average age of 48." Yet, in so-called hard-core gamers' discussion forums, it is easy to find antipathy toward casual games. Rather than being completely gender and age neutral, casual games have distinctive aesthetics and stimulate the growth of a game culture specific to them. Their common emphasis on "cuteness" and easy accessibility stands in clear opposition to the complexity and dark, often violent themes that dominate the form and dynamics of popular "hard-core" genres such as first-person shooting games, for example. The popular perception of casual games and video games in general, however, continues to change.

The history of casual games is as long as the history of games itself. Many classic games (such as mahjong, card games, and board games of the three-in-a-row variety) are currently considered casual games. The powerful expansion of the digital casual games market is nevertheless a rather recent phenomenon. Early examples of casual games include the version of solitaire shipped with Windows operating systems, but it was the expansion of the World Wide Web and broadband connectivity that opened up the space for mass-market casual games to emerge. Several key companies opened their online casual game services around the turn of the millennium: Pogo.com in 1998, PopCap Games in 2000, and Big Fish Games in 2002. Their revenue and distribution models started diversifying the games industry, providing new opportunities for casual games. According to the IGDA's 2008 white paper, six popular casual game business models currently exist: (1) try and buy downloadable games, (2) advergames, (3) ad-supported web games, (4) console downloads, (5) skill games, and (6) microtransaction-supported games. In terms of playable content, the genres of casual games provided through these channels are similar; for example, various puzzle games are popular in all these categories.

Online distribution models have also provided access for independent small-scale games, such as those found at "Orisinal: Morning Sunshine," a website of original Flash games by Ferry Halim. The field of casual games can also provide room for experimentation. For example, some successful student game projects were later revised and released as commercial video games, such as *flOw* (2006) by Jenova Chen and Nicholas Clark. Since the seventh generation of video game consoles (i.e., Microsoft Xbox 360, Sony PlayStation 3, and Nintendo Wii) were introduced with internet connectivity and built-in online marketplaces, the development and distribution of casual games to video game consoles has grown. This particularly stimulated the rise of casual-style sports games. Also, the introduction of games into smartphones and social networking sites such as Facebook accelerated the growth of casual and social games. Meanwhile, there was also room for innovation in the traditional web-based domain of casual games, as proved by the *Mystery Case Files* series introduced by Big Fish Games in 2005, which adapts traditions of puzzle and adventure games into a novel form of crime-themed hidden object games.

The rising popularity of mobile games has challenged browser and Facebook game developers. The success of casual games has continued in new forms in touchscreen–optimized offerings from companies such as King and Supercell.

Frans Mäyrä

See also: *Angry Birds*; *Candy Crush Saga*; *Tetris*

Further Reading

International Game Developers Association (IGDA). "2008–2009 Casual Games White Paper." IGDA, Casual Games SIG, 2008. Available at https://ifip-tc14.org/wp-content/uploads/2017/10/IGDACasualGames-WhitePaper-2008.pdf?

Juul, Jesper. *A Casual Revolution: Reinventing Video Games and Their Players*.

Cambridge, MA: MIT Press, 2009.

Kuittinen, J., A. Kultima, J. Niemelä, and J. Paavilainen. "Casual Games Discussion." *Future Play 2007 Proceedings* (2007): 105–112.

Partridge, A. *Creating Casual Games for Profit & Fun*. Hingham, MA: Charles River Media, 2007.

PopCap Games. "Study: Women Choose 'Casual' Videogames over TV; 100 Million + Women Now Play Regularly, for Different Reasons Than Men." Press Release, October 2, 2006. Available at https://web.archive.org/web/20100424170636/http://www.popcap.com/press/release.php?pid = 208.

Trefry, G. *Casual Game Design: Designing Play for the Gamer in ALL of Us*. San Francisco, CA: Morgan Kaufmann, 2009.

Cathode-Ray Tube Amusement Device. *See* Patent #2,455,992

CD-ROM-Based Games

Throughout the history of video games, developers have used a variety of disc-based storage to distribute content to their audiences: magnetic floppy discs, laserdiscs, and other types of digital optical media. The CD-ROM is based on the compact disc technology developed by Sony and Philips for the music industry. Thanks to its optical encoding and decoding process, a CD-ROM drive can access pits of a few micrometers. Depending on the configuration and system used, a 4.7-inch disc can integrate 540 to 700 megabytes. While the CD-ROM format shares its core technical principle with DVDs (used by the Microsoft Xbox and Sony PlayStation 2) and other dedicated formats (such as the SEGA Dreamcast's GD-ROM and the Nintendo GameCube optical disc), this entry will focus solely on the integration of CD-ROM technology and its influence on game design and development.

COMPACT DISC SYSTEMS

When it became the most common video game distribution format in the mid-1990s, the compact disc (CD) was already a standard in the music industry. In 1980, Sony and Philips agreed upon the specifications of the audio CD format, an agreement known as the *Red Book* standard, which was followed by a *Yellow Book* in the mid-1988 specifying the data structure of CD-ROM technology. Denon also established CD-ROM norms around 1985.

In December 1988, NEC became the first company to bring CD technology to the console world when it released a peripheral for the NEC PC-Engine/Turbografx-16 gaming system. SEGA followed in 1991 with its add-on for the SEGA Genesis/SEGA Mega Drive. These extensions had to rely on the original console's display and processing abilities and featured a 1X drive that could transfer data at a rate of 150 KB per second. In 1989, Fujitsu released the FM Towns computer in Japan, which was built with cutting-edge PC technology to realize the ambitions of its much-touted CD-ROM drive. Back in the United States, the Software Publishers Association (including Microsoft, Dell, Intel, and Creative Labs) was working on a standard dedicated to multimedia applications and games. In 1991, the association established the Multimedia PC (MPC) format, a configuration guideline for PC CD-ROM users. Finally, the Commodore CDTV and Philips CD-i (both released in 1991) introduced another type of CD-based system positioned between home computers and game consoles; these systems were designed to bring a larger array of multimedia applications to the living room.

In 1991, NEC released the first console with a built-in CD-ROM drive; the PC Engine Duo, which was essentially a redesigned PC Engine with the CD and RAM expansions (its American counterpart, the TurboDuo, came out in 1992). The MPC formats were reevaluated in 1993, the same year the 3DO Company and Commodore launched their CD-based consoles. Featuring a 2X CD-ROM drive, the 3DO Interactive Multiplayer and the Amiga CD32 could be upgraded to read Video CDs. With the U.S. release of the SEGA Saturn and the Sony PlayStation in 1995, developers now had the technical means to integrate good-quality full-motion video (FMV) in their CD games: a 2X transfer rate, sufficient working/video memory, and graphical processors that could display thousands of colors. At the same time, these systems were among the first to hardwire real-time three-dimensional manipulation. Notwithstanding the relative affordances and deficiencies of all the CD systems previously mentioned, it is interesting to note that FMV games appeared on most of the systems.

EXTENDED GAMES, EXTENDED PLAY

From the perspective of video game development, CD-ROM technology provided a significant increase of storage space. NEC's marketing stated that one CD offered the capacity of two thousand game cartridges. Although many PC games were already much bigger than 250 KB console cartridges at the time, it is fair to say that the new data space was at least a few hundred times larger than even the most data-intensive titles released on multiple diskettes. Although greater storage capacities opened new possibilities, it also forced games developers to produce more content and contributed to the significant rise of production costs.

To take advantage of the new opportunities offered by the CD-ROM, many developers decided to add content around familiar gameplay experiences. This "extended game" strategy was an ideal way to smoothly transition to the new format. As audio tracks could be read directly from the CD during gameplay, the addition of high-quality musical pieces during gameplay became almost mandatory. Memorable examples include *Ys Book I and II* (1989), *Loom* (1991), and *Winds of Thunder* (1993). CD-ROM technology also became an incentive to include animated cutscenes between gameplay segments. Japanese role-playing games (RPGs) made extensive use of this feature, with early examples emerging on the PC-Engine CD system (such as *Ys* and *Far East of Eden: Ziria* [1989]). Many of these games were already available on diskettes, but even original CD titles appear to have relied on classic formulas augmented with animations or CD music. The novelty of CD audio and animated cutscenes at the time attracted much attention and was emphasized by marketing. Games were also extended with the addition of extra levels not seen in their cartridge editions (e.g., *The Terminator* [1993] and *Zool* [1993]).

In some genres, the rich assets afforded by the CD format could be integrated more intricately into the gameplay. For instance, "talkie" editions of popular adventure games such as *King's Quest V* (1992) or *Indiana Jones and the Fate of Atlantis* (1993) featured digitized voice acting during conversation sequences. In 1993, Trilobyte's *The 7th Guest* and Cyan's *Myst* greatly expanded the spatial navigation aspect seen in graphical adventure games. In the latter, the world was depicted through thousands of completely unique pre-rendered game screens. The CD-ROM format became the ideal outlet for the creation of game worlds saturated with detail.

With digitized audio and video, game developers now had the technical means to pursue the ideal of interactive movies. Games such as *Under a Killing Moon* (1994), *The Beast Within: A Gabriel Knight Mystery* (1995), and *Ripper* (1996) relied on conversation sequences with live-action characters to a great extent. The fascination with FMV sequences integrated into gameplay mechanics spread far beyond the graphic adventure enclave. Thanks to the CD format, American Laser Games could bring its arcade laserdisc titles to home gaming systems (such as *Mad Dog McCree* [1993] and *Crime Patrol* [1994]) and many other live-action and CGI shooters were produced (such as *Surgical Strike* [1993] and *Rebel Assault* [1993]). The most unlikely genre to undergo FMV treatment was undoubtedly the fighting game. In *Supreme Warrior* (1994) and *Prize Fighter* (1994), live-action sequences depicted street fights and boxing as seen through the eyes of the protagonist.

In the global production landscape, action games were outnumbered, and few acquired critical or popular recognition. This failure can partially be explained by a discrepancy between FMV CD-ROM games and contemporary titles in any given genre; data-intensive elements could not be segmented and automated as easily as other types of assets, limiting the system's ability to generate variation and engaging player responses. As the industry began its transition toward three-dimensional visuals that were rendered in real time, the worlds depicted by FMV appeared even more fixed and rigid. Ultimately, these worlds were not only saturated with detail but also with authorship; through their pre-rendered nature, the creators exerted much more control over the interactive encounter.

Carl Therrien

See also: Generations of Technology

Further Reading

Lambert, Steve, and Suzan Ropiquet, eds. *CD-ROM: The Current and Future State of the Art*. Redmond, WA: Microsoft Press, 1986.

Pohlmann, Ken C. *The Compact Disc Handbook*. 2nd ed. Madison, WI: A-R Editions, 1992.

Smith, Greg M., ed. *On a Silver Platter: CD-ROMs and the Promise of a New Technology*. New York: New York University Press, 1999.

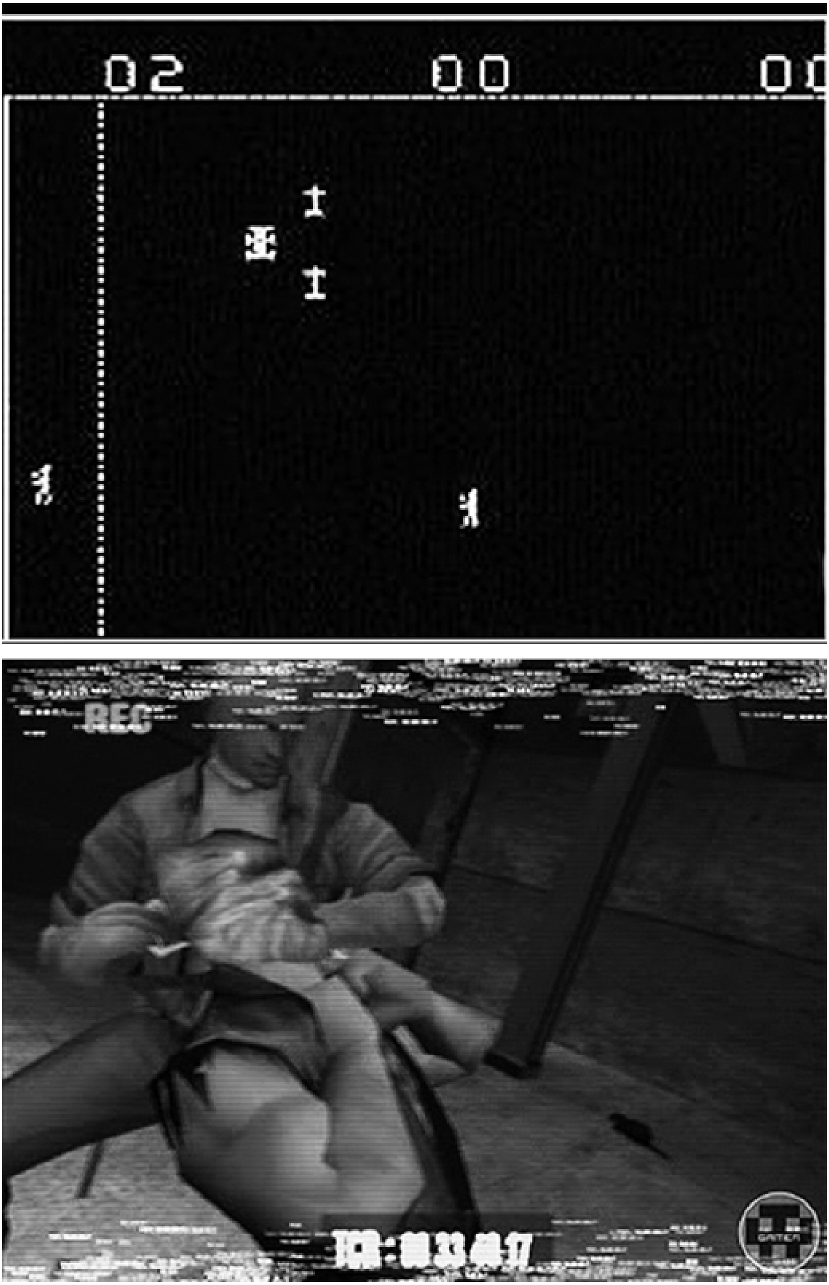
Therrien, Carl. *The Media Snatcher: PC/CORE/TURBO/ENGINE/GRAFX/16/*

CDROM2/SUPER/DUO/ARCADE/RX. Cambridge, MA: MIT Press, 2019.

Censorship

Like books, magazines, film, comics, music, and television before them, video games became the focus of censorship and regulation efforts. Governments around the world have passed laws that restrict access, prohibit content, or even ban certain video games. Every year, a growing number of countries establish censorship rules, classification systems, and ratings agencies with the ambitious aim of regulating games on a wide variety of platforms. Censorship, as the strongest form of regulation, generally means the intervention from superordinate authorities (mostly state institutions) in the creative work of an individual or a group. This intervention aims to protect the public through the control of access to content that is not conformable with the dominant norms and values or is actually harmful to society. In this sense, censorship assumes that all individuals, not just children, are vulnerable and need protection from offensive material. For this reason, most democratic societies have founded state- or industry-controlled rating agencies that evaluate possible dangerous media content: content that might negatively affect the development of children and adolescents or endanger their ability to become moral and ethical individuals.

Ordinarily, regulating bodies look for subject matter that seems to be indecent, for example, pornography or excessive violence, criminal behavior, drug abuse, or hate speech. All these efforts set out to stop the creation of offensive material, to demand changes, to classify and categorize, or to prohibit or restrict the circulation of certain media products.



Exidy's arcade game *Death Race* (1976) [top] and Rockstar Games's *Manhunt* (2003) for the PlayStation 2. (Courtesy of Mark J. P. Wolf)

FORMS OF CENSORSHIP, REGULATION, AND CLASSIFICATION

It is useful to distinguish among different kinds of censorship, regulation, and classification. The first distinction is between pre-, post-, and self-censorship. *Precensorship* is censorship in which each media artifact is screened by a state-controlled board before publication. The board decides whether the respective work may be made public and, if so, under what conditions. Possible requirements are cuts, modifications of the content, or distribution restrictions (regulations that state which people or age groups may access the respective media).

Postcensorship is most common in Western democracies, meaning that the media product will be reviewed after its release, at which time the board will decide on access or age restrictions, modifications, or banning. For example, in Germany, if a game contains certain forms of sexual material (such as child pornography) or symbols of unconstitutional organizations, such as swastikas, the district court can mandate confiscation (Liesching 2010, 15). As a result, access to this material is restricted (Rubin 2010, 925). For example, *Commandos: Behind Enemy Lines* (1998) was seized due to the historically accurate display of National Socialist German Workers' Party (Nazi) insignia, although the player only acts on the Allies' side.

The third form of regulation is *self-censorship*, where game designers and producers modify their games themselves (before or after release). Publishers with a global reach will hire local experts of law to create local game versions, choosing safe distribution over artistic freedom. In other cases, cuts are made to achieve a lower age rating that fits a targeted marketing audience.

The second distinction is between privately regulated and state-controlled classification agencies. For example, the Entertainment Software Rating Board (ESRB) in the United States is run by the industry, whereas the censorship system in the People's Republic of China is controlled by the state. In Germany, both systems are combined; the Unterhaltungssoftware Selbstkontrolle (USK) is, on one hand, financed and organized though the gaming industry, but, on the other hand, age ratings are issued by classification committees chaired by the permanent representative of the Supreme Youth Authorities of the Federal States. Age-rating criteria are curated by an advisory council involving government, science, religion, and other social group representatives.

The third distinction is between rating systems that are mandatory, voluntary, or legally binding only under certain conditions. For example, in Australia, it is statutory for publishers to rate their games by the Australian Classification Board (ACB), and sales of games rated MA15+ to people under the age of fifteen is not allowed. Conversely, in most countries using the Pan European Game Information (PEGI) system, it is not obligatory for publishers to submit games to the PEGI rating agency before they sell them in the PEGI region. In addition, retailers cannot be held accountable afterward if the product is not appropriate for a certain age group. However, in some countries, such as New Zealand, games must be classified when they contain potentially harmful subject matter or if they are probably only suitable for older juveniles or adults.

Some countries, such as Austria, do not have binding nationwide regulation for video games. Instead, each district decides for its own whether a PEGI rating, USK rating, or both are mandatory for vendors and publishers. Russia, on the other hand, is both a very profitable and growing market for video games and has no official state-issued regulation for this sector, apart from the country's ban on media that "advertises homosexual behavior." Although international publishers are keen to release their games, it remains unclear how to identify the legal compliance of a game.

THE RISE OF VIDEO GAME CENSORSHIP

The public debate about video game censorship began with Exidy's arcade game *Death Race* (1976). The goal of the movie-inspired game was to run down gremlins (originally called "pedestrians") that were fleeing from the vehicle. As the player hit them, they would scream and be replaced by tombstones, which the player avoided to prevent vehicle damage. Another controversial game, which changed the focus of the discussion from violent to sexual content, was Mystique's *Custer's Revenge* (1982) for the Atari VCS 2600, in which the Custer player character's goal was to rape a Native American woman tied to a pole.

In the United States, the climax of the debate was reached in 1992 when three games hit the market: *Mortal Kombat* (1992), which showed brutal martial arts action; the shooting game *Lethal Enforcers* (1992); and the full-motion video (FMV) game *Night Trap* (1992), which gave the player a voyeuristic look into a slumber party. The public cried out for regulation, and following some political debates in 1994, the ESRB was established. Subsequently, most major markets introduced their own content rating systems soon afterward.

Regarding the late 1980s and early 1990s in Germany, historians (Junge 2013; Lieven 1994) have classified the debate over potential harmful video games as an ongoing negotiation process in society about changing norms, which had already been in full bloom since the rise of commercial television and video home systems. These discussions led to law amendments such as mandatory age ratings for video tapes (1985); forcing arcades to adopt a strict adult-only door policy (1985); TV and radio broadcasting time restrictions, depending on youth protection criteria (1988); and the founding of the age rating board for computer games, the USK (1994).

These early games revealed what type of content induced discussions or constituted claims for censorship. All regulation bodies share concern for the (excessively) realistic depiction of violence and torture, sexual activities and nudity, racism and discrimination, offenses regarding religious beliefs, insults to national cultural values or territorial sovereignty, obscene or profane language, and the portrayal of gambling, drug use, and criminal behavior.

Most censors believe that this content can stimulate aggressive or antisocial behavior, harm the personal development of younger people, or desensitize individuals. To protect the youth, and sometimes also adults, from these effects, the industry and the state answered with classification systems that are, in the majority of cases, based on a combination of age classes and content descriptors that indicate game elements that may trigger a certain rating or may be of interest to parents. However, the foundations for these evaluations can be very different, ranging from industry checklists or video summaries of possibly debatable content to the reviews of play testers.

RATINGS SYSTEMS

As noted earlier, in the United States and Canada, the market is regulated by the industry-controlled ESRB. Although this system is strictly voluntary, nearly all video games that are published in the United States are submitted for a rating because most retail stores do not support the sale of unrated video games, and no major console manufacturer has licensed an adults-only (AO) game for its system or published a game without an ESRB rating. An exception arose with *Grand Theft Auto: San Andreas* (2004), when the M-rated (Mature) game got an AO labeling after the discovery of a sexual minigame called the "Hot Coffee" mod. The publisher later fully removed the sexual interactive content to get the previous M rating again.

Similar to the ESRB, the industry-controlled PEGI system uses five age categories and only seven content descriptors (the ERSB uses more than thirty). The usage of PEGI is also voluntary and likewise based on a code of conduct to which every publisher using the system is contractually committed. The system has replaced many national age-rating systems since 2003 and is, as of early 2019, predominant or accepted in thirty-nine countries, which is remarkable considering the cultural diversity and varying norms of member states. For example, Greece is very concerned about gambling, so when PEGI began, games with gambling were given ratings for a mature audience. Because of this, countries that still use the PEGI system are forced to slightly over- and underblock video games that include criteria like gambling, depending on the cultural norm prevalent, in comparison with the leveled PEGI ruling on the respective criteria. Germany also has its own system, the USK, because protection of the youth is demanded by the German constitution; consequently, publishers and retailers are legally bound to ensure that children and adolescents are not harmed in their development.

From 1994 until around 2010, publishers that aimed for a release in Germany were often forced to modify their games using strategies such as reducing the amount of gruesome content, changing the red color of blood to green or blue, or converting human victims or opponents to nonhumans (e.g., zombies or space aliens). Low-violence versions of games such as *Half-Life* (1998), *Saints Row* (2006), and *Prototype* (2009) were released, as the respective original game codes were banned from being sold in public spaces by the Federal Review Board for Media Harmful to Minors, a German governmental youth protection agency.

From 2010 on, fewer games were refused classification in Germany. Simultaneously, more game publishers successfully started procedures of delisting old games that had previously been indexed or seized by the court or the Federal Review Board. As of 2019, the last market relevant triple-A game production that failed with an uncensored release was *Carmageddon: Max Damage* (2017).

The most important rating agencies in Asia are the Japanese Computer Entertainment Rating Organization (CERO), the Chinese General Administration of Press and Publication (GAPP), and the South Korean Game Rating Board (GRB). In Japan, there are hardly any obligations to get a classification before publication or real restrictions for the retailer, with the exception of so-called Z games. For these adult titles, a review process through the government is mandatory, selling is only allowed in separate salesrooms, and an age-verification process is necessary. Another exception is erotic games, called *Erogem* in Japan.

They are regulated by specialized industry organizations such as the Ethics Organization of Computer Software (EOCS) or the Contents Soft Association (CSA). Normally, Erogem titles are only published in Japan, but the game *RapeLay* (2006) was also sold over Amazon.com, which started a heated debate in game-rating politics around the world on the controversial "stalking and raping" theme. Since the rise of home VR hardware, erotic games have started to pop up in Western online storefronts like STEAM, leading to intense public debates.

In China, the GAPP uses an obligatory checklist to test whether a game is violating basic principles of the Chinese constitution; threatening national unity, sovereignty, or territorial integrity; divulging state secrets; threatening state security; damaging the nation's glory; disturbing the social order, or infringing on others' legitimate rights. Additionally, the Ministry of Culture (MoC) requires that game companies develop techniques to limit the playing time of minors to prevent addiction. The South Korean system resembles the Chinese one insofar as every game developer and distributor must have its games rated before publication. In particular, titles can be banned from the market if they focus on the conflict between South Korea and North Korea (e.g., *Tom Clancy's Ghost Recon 2* [2004] and *Mercenaries: Playground of Destruction* [2005]).

Australia is also an interesting case because the highest age category was MA 15+ (not suitable for people under age fifteen) until 2011, which meant that it was the only country without an age class for games aimed at an adult audience at that time. In 2011, an 18+ rating was introduced. Officially, the Australian Classification Board (ACB) does not censor material by ordering cuts or changes, but it is able to effectively regulate media by refusing classification and making this kind of media illegal for hire, exhibition, or importation to Australia. The country's firm stance on the issue of drug abuse led to the refusal of classification for several uncut video games that featured real or fictional drugs, for example, *Fallout 3* (2008) and *Saints Row IV* (2013). The board green-lighted *Fallout 3* after the game company, Bethesda, renamed one of its in-game drugs (morphine) as the fictional Med-X. As news journalists pointed out (Haas 2008), these changes were issued globally, not only in Australia.

ONLINE RATING JOINT VENTURES AND REGULATION

The rise of online gaming, mobile gaming apps, and browser games in recent years has started a heated discussion of potential harmful content in online video games that partially mimic previous youth protection and censorship debates from "the old age of retail distribution" of film, games, and other media. At the same time, these discussions overlap with debates about social media addiction, hate speech, and fake news or center around new methods of video game marketing, such as in-game purchases, loot boxes, games as a service (GaaS), and free-to-play (F2P) games monetized through advertisements or user data reselling. In 2018, both Belgium and the Netherlands decided that games such as *FIFA 18* (2017) and *Star Wars Battlefront II* (2017) that used loot box mechanics contravened local gambling acts and forced the publishers to change their game contents.

Due to the merging of different media types into multimedia online content, current online censorship and filter systems have moved from local and single media approaches to ones of global scale. Early prototypes, such as the Independent Game Rating System (TIGRS) and PEGI Online, have either disbanded or are rarely used by companies. In 2013, ESRB, PEGI, USK, the Brazilian ClassInd, and the Australian Classification Board founded the International Age Rating Coalition (IARC) and created a global rating tool for online distributed media. Instead of traditional rating procedures for video games, all content is classified by completing a questionnaire about potential harmful content and then results in an automatically generated age rating for all countries that are part of the coalition. The rating is validated with spot checks. In 2017, the South Korean Game Rating board GRAC joined IARC. Use of IARC's automated classification tool is, as of early 2019, mandatory for online content providers prior to their releasing games in the following storefronts: Google Play Store, Microsoft Windows and Xbox Store, Nintendo eShop, and Oculus Store. Depending on the answers given through the questionnaire by developers or publishers, games may be refused a rating and therefore refused a release in a country or global storefront, which is a new iteration of precensorship not by state institutions but by automated upload filter software.

CRITICISM OF GAME REGULATION

Video game censorship and regulation is often criticized for some underlying assumptions: first and foremost, there is the implicit assumption that digital (not analog) games, due to their inherent interactivity, have a stronger influence on users than other media products (Olson 2010, 2). For instance, stimulating aggressive behavior or inhibiting empathic emotions are highlighted, whereas possible positive effects, such as the improvement of spatial or process reasoning, are ignored or marginalized.

Another criticism revolves around the confusing variety of rating regulations and the impact of the industry on the evaluations. For video game companies, there is the problem that a unified international ratings system is absent for the retail market, making it is necessary to submit an international title to different rating agencies with various requirements. Also, even in cases in which unified approaches such as PEGI (retail, Europe) or IARC (online-only, global) exist, these industry-driven systems strongly vary in their level of legal protection through different countries. Additionally, in some nations, there is no legal certainty to prevent the banning of an already published game, so a publisher risks losing investments. On the other hand, critics believe that game companies have too much influence on rating decisions; for example, a big publisher may obtain a Teen (T) rating for a rather mature title by fraud. This point is supported by the argument that the industry frequently markets Mature (M) games to teenagers, often through advertisements in youth magazines or respective television shows (Rubin 2010, 929). But most of the time, both sides agree that there should be more consumer awareness of rating systems and that the retailers of games should be forcibly pressured to enforce age restrictions.

Finally, there is criticism of the rating process itself. First and foremost, the methods used to get a review for a game are denounced. For example, is it sufficiently trustworthy to (only) rely on an industry questionnaire or the screening of a video edit of possibly objectionable parts of a game without actually playing the game itself? (Rubin 2010, 928). Another critical point is that many raters focus too much on the (graphic) realism and amount of violence in a game and often neglect the importance of specific gameplay aspects; many censors do not consider whether the displayed aggression is justified, whether the gameplay also allows nonviolent actions or solutions, whether gruesomeness is rewarded, or how the game controller alters the feel of the game. For instance, some critics mentioned the play experience of *Manhunt 2* (2007) was more immersive on the Nintendo Wii (the Wii remote is used to act out executions) compared with other platforms (Casamassina 2007).

Describing the first *Manhunt* (2003), Jose Zagal wrote,

> *Manhunt*'s player-based (rather than character-based) moral dilemma is made all the more intense through the use of a USB headset. Playing the game using the headset allows the player to use his voice to distract enemies in the game. It also allows the player to hear the Director's instructions directly via the earpiece. Both elements narrow the distance between the player and the grotesque world of *Manhunt*. The microphone does this by allowing a more direct form of agency while the headset heightens the tension by channeling the Director's wishes and desires directly to your ear. In this way, the Director assumes the role of the "evil conscience." As a player, you hear him inside your head. His voice goads, taunts, and cheers you on when you cave in to his desires. There is nothing more sickening and disturbing than hearing the Director cackle maniacally as Cash murders a gang member. As expected, the Director derives more pleasure from the more gruesome executions. (Zagal 2009, 5)

Identical age ratings of one game across all platforms show that age rating in Germany generally ignores the technical setup of the content that is rated. Even virtual reality (VR) adaptations of games that are also available without VR share identical game ratings, such as *Resident Evil 7* (2017) and *Subnautica* (2018). That means screen size, input methods, and VR stations have no impact on the age rating.

This leads to an argument about the accuracy or objectiveness of the game ratings, the underlying logic of the rating criteria, and the selection of the people who are responsible for the evaluation of games, for example, whether raters with different norms and values judge differently or whether experienced players adjudicate, unlike the layman (Rubin 2010, 927). Finally, it is hoped that in the future, the positive effects of playing games will also be part of rating decisions and that the artistic value of games will be more recognized.

RECENT CHANGES IN CENSORSHIP CRITERIA

In the case of censorship versus recognition of video games as items with artistic value, two decisions against censorship have sparked hope for defenders of the video game media form. German developer Yager Development's *Spec Ops: The Line* (2012), a video game interpretation of Joseph Conrad's novel *Heart of Darkness* (1902), was rated 18+ after several appeals and petitions from both federal representatives and Yager itself in Germany. In a 2014 press release, the rating board announced a change to its guidance criteria and added a line to the preamble about games being able to have “characteristics” of “contemporary art forms of entertainment media.” The press release explicitly stated the discussion around *Spec Ops* as a major influence on these changes.

Recently, the rating applicability of unconstitutional symbols changed in Germany when the federal youth protection authority officially changed its legal standpoint on the case of social adequacy in video games. Before that, governmental institutions followed the line of games being products of entertainment and not art. This was based on an official court ruling banning *Wolfenstein 3D* (1992) in 1994. Therefore, all display of swastikas or other unconstitutional symbols were considered illegal—regardless of the context in which a symbol was used. In theory, the German constitution (Grundgesetz) carefully balances freedom of art and censorship for the protection of minors. As films were already considered art, the use of unconstitutional symbols is generally allowed, as in the uncut release of *Raiders of the Lost Ark* (1981). The film was rated 12+, including all the original National Socialist (Nazi) insignia and uniforms.

In 2018, the attorney general of Stuttgart decided to abandon a penal code case against the use of a swastika in a browser game called *Bundesfighter 2 Turbo* (2017), which caused a discussion about art in games that ultimately led to the change in administration without any legal amendments. Shortly afterward, an early-access version of the small indie game *Through the Darkest of Times* (2018) became the first successfully rated video game in Germany containing swastikas.

Markus Wiemker and Paul Dalg

See also: Entertainment Software Rating Board

Further Reading

Brathwaite, Brenda. *Sex in Video Games*. Boston, MA: Charles River Media, 2007.

Casamassina, Matt. “Eyes on Manhunt 2 Wii.” IGN, May 25, 2007. Available at http://uk.wii.ign.com/articles/792/792012p1.html.

Garrelts, Nate, ed. *The Meaning and Culture of Grand Theft Auto*. Jefferson, NC: McFarland, 2006.

German Entertainment Software Self-Regulation Body. “Press Statement on the Artistic Relevance of Video Games.” 2014.

Gonzalez, Lauren. “When Two Tribes Go to War: A History of Video Game Controversy.” GameSpot, January 10, 2007. Available at http://www.gamespot.com/features/6090892/index.html.

Haas, Pete. “Australian Censorship Makes Fallout 3 Better Everywhere.” Cinemablend, 2008. Available at https://www.cinemablend.com/games/Australian-Censorship-Makes-Fallout-3-Better-Everywhere-12150.html.

Hyman, Paul. “Rated and Willing: Where Game Rating Boards Differ.” *Game Developer* 12 (December 15, 2005). Available at https://archive.org/details/GDM_December_2005/page/n11/mode/2up?

Junge, Thorsten. “Jugendmedienschutz in der Bundesrepublik Deutschland (ab 1949).” In *Jugendmedienschutz in Deutschland*, 41–64. Wiesbaden, Germany: Springer, 2013.

Kutner, Lawrence, and Cheryl K. Olson. *Grand Theft Childhood: The Surprising Truth about Violent Video Games, and What Parents Can Do*. New York: Simon & Schuster, 2008.

Liesching, Marc. “Hakenkreuze in Film, Fernsehen und Computerspielen.” *BPJM-Aktuell* 3 (2010): 11–17.

Lieven, Jan. “Jugendschutz und Medienkontrolle seit den 50er Jahren. Zur Entwicklung der Strukturen und Arbeitsweisen des Jugendmedienschutzes in der Bundesrepublik Deutschland.” In *Handbuch der Medienpädagogik*, 167–182. Opladen, Germany: Leske und Budrich, 1994.

Olson, Cheryl K. “Video Game Politics: An Update.” 2010. Available at https://web.archive.org/web/20101105194539/http://media.industrygamers.com/misc/GTC-updated-intro-standalone.pdf.

Rubin, Stephen. “Content Regulation.” In *Introduction to Game Development*, edited by Steve Rabin, 923–936. Boston, MA: Charles River Media, 2010.

Zagal, José P. “Ethically Notable Videogames: Moral Dilemmas and Gameplay.” In *Breaking New Ground: Innovation in Games, Play, Practice, and Theory*, Proceedings of DiGRA 2009. Available at http://www.digra.org/dl/db/09287.13336.pdf.

Channel F. *See* Fairchild/Zircon Channel F

Cheating

Most video game players define *cheating* in a game as anything that gives the player an unfair advantage. Beyond that, there is great disparity on what different players and different game designers and publishers consider cheating. However, there are some commonalities across definitions and practices, and there are several common reasons why people cheat in video games.

One type of cheat is the use of information external to a video game, which is commonly found in walkthroughs; strategy guides (which are mainly illustrated walkthroughs); hints and tips found in YouTube videos; wikis, forums, and discussion boards; and information gleaned from asking other players. Most of these types of cheats are considered legal and acceptable by the game industry, and, indeed, many game publishers sponsor the creation of official strategy guides for their games and release hints and tips to YouTubers and popular gaming sites.

Another type of cheat is one that alters the code of a video game and can include cheat codes, hacks, bots, and other technical changes. Examples of cheat codes include codes entered via keyboard or controller that allow the player such things as unlimited lives or money or access to levels further along in the game. Perhaps the best known “cheat” in video games is the Konami Code (up, up, down, down, left, right, left, right, B, A), which allowed players of many Konami games (such as *Contra* [1987], the *Castlevania* series, and some *Dance Dance Revolution* titles) to unlock various game elements or hidden secrets. More controversial cheats include software programs that attempt to intercept, access, or alter game code in multiplayer online games. Such cheats include aimbots (which allow the player to aim with perfect accuracy) and wall hacks (which allow the player to see through walls).

Another form of cheating that has garnered international attention is the practice of "gold farming" in massively multiplayer online role-playing games (MMORPGs) such as *Final Fantasy XI* (2002), *World of Warcraft* (2004), and *The Lord of the Rings Online: Shadows of Angmar* (2007). Essentially, companies in other countries, especially China will set up shop and hire workers to play a game such as *World of Warcraft* to gather resources and in-game currency (usually termed "gold"). The shops then sell this gold (usually via a broker, such as the International Game Exchange) to players globally. This practice violates most MMORPG terms of service, yet many players engage in the practice. Many MMORPG developers actively work to identify and then ban gold farmers from their games. Some, such as Sony Online, have created specific servers for their games (such as for *EverQuest II* [2004]) where the purchase and sale of virtual goods for real cash is allowed and, perhaps more importantly, controlled by the game company itself.

No matter the form of cheating, there are several common reasons that players will cheat in a game. The first is that players become stuck and are unable to progress further in a game. This could be due to the difficulty level of the game being too high for the player or a poorly designed game with unclear options or indications as to how players should proceed. For most players, this is the predominant form of cheating, because without being able to resort to a walkthrough, FAQ, or cheat code, they would be unable to progress in the game. The second reason for cheating is to fast-forward through various parts of a game. Players will use codes to get to the end of a game or skip levels because they have grown bored with the game's content but wish to see how the game ends. Likewise, in the case of gold farming, players who buy gold are fast-forwarding their experience, so they may gain access to more powerful equipment or advanced areas before the game designers had dictated they should be able to do so. The third reason for cheating is that players wish to play God and obtain all items, money, or actions within a game simply to have fun. The final reason, which only applies in multiplayer games, is to harass other players and get ahead relative to them. For this type of cheating, having every advantage possible is the central reason for doing so, although causing other players to fall behind or ruining their gaming experience can be part of the experience. These are the main reasons that players currently cheat in single-player, multiplayer, online, and off-line video games.

Current industry responses to cheating are varied and evolving. Most game developers do not care whether players cheat in single-player games because they feel the player is the only person affected in such instances. Many companies actually encourage cheating in single-player games through the use of walkthroughs, YouTube videos, and cheat codes. Releasing such artifacts can extend the play of a game that players may have grown tired of as they explore new options. Most players now rely on free FAQs and walkthroughs found online at sites such as gamefaqs.com. In multiplayer games, however, developers take a harder line against cheating because it can potentially ruin the experience of other players, many of whom do not cheat. Companies such as Even Balance have created software such as PunkBuster that can detect cheating in games such as

America's Army (2002) and the *Call of Duty* series. Finally, companies such as the *World of Warcraft* developer Blizzard have taken an active role in banning thousands of accounts suspected of cheating in their games to minimize the activity.

Although companies often take a hard line on particular actions they deem cheating, players are often more varied in what they consider acceptable and unacceptable forms of play. For some players, "camping" in a particular spot in a first-person shooting game qualifies as cheating; for others, it is a strategic play style. Likewise, some players consider using a walkthrough, even in a single-player game, as a form of cheating, even if they ultimately consult one. Although developers can patrol for and decrease certain forms of cheating, players will find endless new ways to cheat and will endlessly debate what exactly constitutes cheating in a video game.

Mia Consalvo

See also: "Beating" a Game; Gold Farming

Further Reading

Consalvo, Mia. *Cheating: Gaining Advantage in Videogames*. Cambridge, MA: MIT Press, 2007.

Dibbell, Julian. *Play Money: Or How I Quit My Day Job and Made Millions Trading Virtual Loot*. New York: Basic Books, 2007.

Kafai, Y., and D. Fields. "Cheating in Virtual Worlds: Transgressive Designs for Learning." *On the Horizon* 17, no. 1 (2009): 12–20.

Kücklich, Julian. "A Techno-Semiotic Approach to Cheating in Computer Games: Or How I Learned to Stop Worrying and Love the Machine." *Games and Culture* 4, no. 2 (2009): 158–169.

Yan, J., and B. Randell. "A Systematic Classification of Cheating in Online Games." *NetGames '05*. Hawthorne, NY: Association for Computing Machinery, 2005.

Checkpoints

Checkpoints in video games are used to mark a player's passage through a game, generally allowing the player to resume play from the previous checkpoint. Often associated with save functionality in a video game, a checkpoint often operates as a predetermined point within a game, such as the completion of a game's level or similar milestone. After a player passes through a checkpoint, the next time he or she plays the game, play will resume from this checkpoint; however, its presence is not always readily apparent, and checkpoints may be entirely invisible within a game as the player passes through them. Checkpoints are used in differing modes that are dependent on the type of game and the play mechanics used in a particular game.

Among the first and perhaps the clearest example of a checkpoint in a video game is the use of game levels in arcade games. Nintendo's *Donkey Kong* (1981), for example, features several sequential game screens through which the player must progress. After a player completes the first screen, he or she then moves to the second level of play; the start of this second level serves as a checkpoint. If the player is unsuccessful in completing the second level, he or she will start again at the beginning of the second level instead of the first level.

Arcade racing games may incorporate checkpoints at a particular point on a game's racecourse, rewarding the player with more time to play the game. Games such as SEGA's *Out Run* (1986) provide a player with a set amount of playing time in each playing session, which counts down during play. If the player successfully reaches subsequent checkpoints on the racing course, the playing time is extended, allowing the player to play longer and attempt to reach the next checkpoint. Successful play of *Out Run* and similar games, then, requires successful completion of a series of checkpoints.

Dragon's Lair (1983) employs another mode of checkpoints; the game consists of a series of hand-drawn animated sequences that are stored on a laserdisc. It requires players to input basic movements with a joystick and button at predetermined moments during the animations. A game of *Dragon's Lair* appears much like a cartoon, with portions of the screen in a scene flashing to prompt the player's movement of the joystick to control Dirk the Daring, the player's avatar. For example, the left side of the screen will flash if the cartoon character is threatened by an enemy, indicating the player should move the joystick left to successfully avoid the danger. The game presents these animated sequences as a series of scenes, and players are penalized if they move incorrectly in a given scene of the game. These scenes are also checkpoints because the game will generally restart the player at the beginning of a given scene until he or she successfully completes the sequence and moves to the next scene and checkpoint.

As home console–based games have grown increasingly complex and require considerably more time than arcade games to complete, checkpoints often play a more central and incremental role in more recent games. Activision's *Call of Duty: WWII* (2017) is a first-person shooting game that features a single-player campaign that requires the player to navigate complex and chaotic maps of prescripted events during World War II battles. As in other games in the series, each single-player level of the game has a series of invisible checkpoints from which players will restart if they unsuccessfully maneuver and die, greatly reducing the difficulty of the game by not requiring the player to start a given level over. Other first-person games and games of other genres employ a similar checkpoint system or one linked to an automatic save function (auto-save) in which a player's progress is regularly saved at a series of checkpoints. This and other uses of checkpoints can greatly reduce the player's need to repeat sections of a game and minimize player frustration and thus can make video games more pleasurable experiences.

FromSoftware's fantasy role-playing game *Dark Souls* (2011) restricts saving and subverts this model by leveraging checkpoints as a core gameplay mechanic. Players explore the levels of the game world and may save their progress by resting at bonfires to restore their health and preserve the souls of enemies that they have defeated since their last save. These souls are used at bonfires to level up the player's character to become more powerful and thus play a critical role in game progression. However, resting at these bonfires also resurrects defeated enemies on the level, transforming the decision to use a checkpoint into a strategic one, as players must decide whether saving their progress is worth respawning enemies. Saving progress and restoring or leveling up the player's character via a checkpoint in the game can thus make further progress from that checkpoint forward more challenging.

Christopher Hanson

See also: Save Function

Further Reading

Hanson, Christopher. *Game Time: Understanding Temporality in Video Games*. Bloomington: Indiana University Press, 2018.

Chen, Jenova (1981–)

Jenova Chen is the professional name of the video game designer Xinghan Chen. He designed several award-winning video games that were well received and gained critical acclaim, including *Cloud* (2005), *flOw* (2007), *Flower* (2009), and *Journey* (2012). These games were primarily intended to create positive emotions in players rather than to highlight challenges (e.g., Chen intended *Flower* to provoke positive emotions and *Journey* to forge emotional connections between the player and anonymous players within the gameplay). While a student at the University of Southern California (USC), Chen cofounded the independent video game development studio thatgamecompany in 2006.

Born and raised in Shanghai, Chen completed his master's degree in USC's Interactive Media Program (a division in the School of Cinematic Arts). It was during this time of study that he, as part of a team of students, designed his first independent game, *Cloud*. Supported by a grant from the university, *Cloud* was released as a free download in October 2005. This first game was very well received: within ten months, the game was downloaded 600,000 times. Chen's next game, *flOw*, was a master's thesis project with another student and was even better received by players: after its release in March 2006, it received 650,000 downloads in less than five months.

A short time later, Chen cofounded his own independent video game development studio, thatgamecompany. The company's first release, in February 2007, was a PS3 version of *flOw* that succeeded in becoming the most downloaded game on the PlayStation Network in 2007. The company's second release, *Flower*, was equally critically acclaimed. Chen had established his name in the game industry by then. It was during the development of *Flower*, in 2008, that Chen was named in the *MIT Technology Review* magazine's annual list of "Innovators under 35."

The next game released by Chen and thatgamecompany was *Journey* (2012). Given the fact that all earlier games that had been (co)developed by Chen were highly successful, it was no longer surprising that *Journey* also continued the wave of critical praise from a wide audience. *Journey* focused more than its predecessors on communication and social interaction within gameplay. Unlike most other existing games, it does not emphasize specific collaborative goals or tasks to enhance communication but leaves an option for the player to decide whether to play alone or jointly with other players.

Some of the games (co)developed by Chen have been parts of art exhibitions; *flOw* has been acquired by the Museum of Modern Art (MoMA) for its video game collection, and *Flower* has become part of the Smithsonian Permanent Collection. As of mid-2019, Chen and thatgamecompany are in the process of developing a new game, *Sky*.

Xenia Zeiler

See also: Contemplative Games; that game company

Further Reading

Kumar, Matthew. "Develop 2009: Thatgamecompany's Chen on How Emotion Can Evolve Games." Gamasutra, July 15, 2009. Available at http://www.gamasutra.com/view/news/24442/Develop_2009_Thatgamecompanys_Chen_On_How_Emotion_Can_Evolve_Games.php.

Parkin, Simon. "Jenova Chen: Journeyman." Eurogamer, April 2, 2012. Available at https://www.eurogamer.net/articles/2012-04-02-jenova-chen-journeyman.

Sheffield, Brandon. "Finding A New Way: Jenova Chen and Thatgamecompany." Gamasutra, May 5, 2008. Available at http://www.gamasutra.com/view/feature/3648/finding_a_new_way_jenova_chen_and_.php.

Chile

Some of the earliest game development work coming out of Chile can be attributed to a small game enthusiast group made up of three brothers, Andrés, Carlos, and Edmundo Bordeu, formally known as ACE Team, which is arguably the most prominent game development studio in Chile as of 2019.

In 1999, the brothers launched two *DOOM II* (1994) total conversion mods, *BATMAN Doom* and *ZanZan*, and later in 2002, using *Quake III: Arena* (1999), with the help of programmer Juan Pablo Lastra, they launched a mod called *The Dark Conjunction*. In the same year, the group became a formal company with the initial goal of completing its first professional development, *Zenozoik: Shattered Land*, but its development abruptly halted for a few years when a game-changing entrant asked for their help: Wanako Games.

After a few years, in 2007, they returned to their secret project, *Zenozoik*, and restarted it from scratch. At that point, technology-wise, it only served as the spiritual predecessor of the company's debut game, *Zeno Clash*, which launched on April 21, 2009. It went on to win a PC Gamer award as the 2009 Independent Game of the Year, and ranked sixty-fifth on its "List of the 100 Best PC Games." The ACE team is also well known for its *Rock of Ages* saga, currently in its third iteration, slated for 2020 for all major platforms.

Back at the beginning, in 2002, the Argentines Tiburcio de la Cárcova, Esteban Sosnik, Santiago Bilinkis, and Wenceslao Casares (of patagon.com fame) founded Wanako Games, and over time, they developed and released over twenty casual games for the major platforms, including PC, original Xbox, and PlayStation 3, even trying out some Wii and Kinect experiments.

The company was acquired by Vivendi Games in early 2007 for USD 10 million, and after the merger between Vivendi Games and Activision that formed Activision Blizzard in July 2008, Wanako Games was sold by Activision to Artificial Mind and Movement (A2M) at the end of 2008.

In 2010, A2M changed its name to Behaviour Interactive, rebranding Wanako Games as Behaviour Santiago and shutting it down its operations on November 20, 2017. The studio had over forty-five employees during its peak, and at the time, Wanako Games was considered the major video game development studio in Latin America; by many, it was also widely regarded as the real-world-training "university" that local talent graduated from. Some of its most relevant works are *everGirl* (2005), *Assault Heroes* (2006), *Assault Heroes 2* (2008), *Doritos Crash Course* (2010), and *Fallout Shelter* (2015).

At the end of 2008, Sosnik and De la Cárcova resigned from Wanako Games to found Atakama Labs, a new video game firm focused on mobile games. Two years later, the success of the venture caught the attention of the Japanese giant DeNA, which acquired the studio for an estimated USD 6 million and became DeNA Chile. It had several dozen employees at its peak and released *Star Wars: Galactic Defense* in October 2014. The company shut down its operations at the end of 2016.

In the mid-2000s, developer-focused digital distribution platforms such as XBLA and Steam greatly helped companies like Wanako Games and ACE Team place their offerings up for sale worldwide, thus generating much media awareness that, in turn, with the advent of mobile app stores, allowed many technically inclined people to dream up their own projects and finally take a leap of faith and found their own studios.

In that sense, the pioneer mobile studio in Chile from the early 2000s is now the apparently defunct Psycho World, which originated from the demoscene, and was founded in 2002 by Max Celedón and César Hernández with the support of 3IE Santa María University's own technology incubator. The company went on to create over thirty feature-phone-based games in J2ME; the first Chilean three-dimensional game engine, Universe Generator System; and the first Chilean instant messaging client for feature phones built from scratch.

In 2003, Camila Gormaz, founder of indie game studio BURA, started as a solo developer with an RPG Maker 2000 project that would later be released in early 2016 as a demo to raise money on the crowdfunding platform Indiegogo. By the end of 2016, with the addition of Camilo Sáez, Camilo Valderrama, Jesús Morillo, and Pablo Videla, BURA released the early access version of *Long Gone Days* in March 2018 on Steam and Itch.io. The game is a two-dimensional modern-day military RPG set in the present, though it is inspired by classic dystopian literature and visual novels. On November 5, 2019, in the midst of the protests that have taken place in Chile since October 2019, Camila Gormaz launched a budget management simulation on Itch.io called *Nanopesos* as a social commentary game built on Twine to help understand the living situation of "more than half of workers in Chile" (https://web.archive.org/web/20190914031855/https://www.cnnchile.com/economia/ine-la-mitad-de-los-trabajadores-en-chile-recibe-un-sueldo-igual-o-inferior-a-400-000-al-mes_20190813/).

In 2006, AmnesiaGames started developing games in J2ME that survived the changeover from feature phones to touch-enabled mobile phones. The company is led by the longtime Universidad Catóelica video game professor Alejandro Woywood, named Forum Nokia Champion and the first president of the national video game developers trade association VGChile. The studio went on to create the games *Ninja Joe* (2012) and *31 Minutos* (2013), among others, and between 2007 and 2012, it created and operated two major national mobile portals, Entel and Claro, with over twenty million monthly page views.

In 2006 and 2007, the mobile company Movistar and mobile marketing incubator AndinaTech helped kick-start the local development scene by launching the Crea tu Juego competition, which attracted many students from technical and humanities backgrounds to pitch and develop their own games targeting the feature-phone market. Travel, hardware, and distribution agreements were some of its top prizes, and in 2006, the top accolades went to the hobbyist group Nemoris Games formed by Ricardo Concha and Carlos Hurtado, both from Universidad Austral de Chile in Valdivia, for its game *El Peluquero de Medusa* (2006). In 2007, the third prize was won by Chriss Vásquez from Puerto Montt, the current partner and director of public relations and marketing at Nemoris Games, with the game *Asado Cavernícola* (2007).

Nemoris Games launched the social commentary action game *Negro Matapacos* for Google Play and PC/Mac on Itch.io in November 2019 following the protests that had taken place in Chile during October 2019 as "a tribute to those who fight every day and also a recognition of the puppy that has become an emblem of the social movement in Chile."

Gamaga was founded in 2009 by Rodrigo Contreras, who was later joined by his sister Fernanda Contreras as COO in 2012 and sometime in between by the experienced Bryan Salt as creative director. The company had an impeccable track record, beginning as a small start-up and becoming the largest independent video game studio in Chile as of late 2019 with several dozen employees, thanks to hits such as *Banana Kong* (2013), *Operate Now: Hospital* (2016), *Red Crimes: Hidden Murders* (2018), and Best Mobile Game People's Choice Awards nominee *Holly's Home Design* (2018).

Around 2005, several engineering students from Universidad Santa Maria founded USM Games, an enthusiast group supporting fellow students through workshops, talks, and specialist support for development projects of many emerging developers and teams. In 2008, one such group, initially named Mazorca Studios, worked on early augmented reality (AR) technology with Pablo Mera, releasing *Chocapic 3D* (2010), and in 2011, part of the original group became the company now known as IguanaBee, which was founded by Iván Vera and Daniel Winkler, who was also a part-time professor at Universidad Santa María. IguanaBee has released several games, including *Monsterbag* (2015), for PlayStation Vita; a brief flashback to its AR roots, *Raise: Imaginary Pet* (2016), a Tamagotchi-style game for Google Tango; and *Headsnatchers* (2019), for Steam and the Nintendo Switch.

Founded in 2014 by Andrés Ayala and Andrés Constantinidis, TinyBytes has quietly amassed a large fanbase due its lean, fast, and experienced team that has executed a long-term vision to address midcore mobile players. The company is becoming more and more interesting to investors who bank on great talent working at high-quality games that are competitive in a niche by growing global communities of gamers. TinyBytes started by launching *Battle of Toys* (2015) followed by a series of experimental short-session games, culminating in its sophisticated real-time multiplayer flagship product *Massive Warfare: Aftermath* (2018), which achieved over five million downloads and a nomination for the Indie Prize London 2018.

The year 2015 saw the rise of AOne Games, a team founded by Max Kubler and Sebastián Gana that went all in on a three-year quest into one of the most ambitious attempts at game making in the history of the local scene. The resulting *Omen of Sorrow* (2016) was released June 20, 2016, for PC and November 6, 2016, for the PlayStation 4. It won Best Technical Challenge in EVA 2017, and it was one of the best demos of 2017 at the Shoryuken Fighting Game Awards; however, belonging to the very tight, super-competitive niche of the fighting games genre did not help when it took a beating from hardcore fans and the specialized press.

At the end of 2015, Maureen Berho and Nico Valdivia, a sociologist and a psychologist, respectively, founded Niebla Games, a studio that focuses on the development of board games and video games that stand out for their artistic value and originality. *Causa: Voices of the Dusk* (2019) is the first video game developed by the studio, and it was present at the Indie MEGABOOTH of both PAX East and PAX West as well as other shows. Beyond her video game career, Berho has won several accolades for her leadership as a female entrepreneur, including the second place Young Entrepreneur Award for Women in 2017.

One of the newest companies is a rebirth of sorts: Giant Monkey Robot was founded in 2017 by Juan Pablo Lastra, Benjamín Prieto, and Tomás Henríquez, all veterans from Wanako Games; together with others from DeNA Santiago, they comprise a team of over thirty developers that have been working with the latest technologies in games and participating in coproductions with other companies, one such example being *Rock of Ages 3: Make & Break* (2020) alongside ACE Team.

INSTITUTIONAL AND DEVELOPMENTAL ECOSYSTEM SUPPORT IN CHILE

Through the Program of Creative Industry, the Corporation for the Promotion of Production (Corfo) offers various lines of support for financing activities in various stages of production; development, international, and domestic commercialization; and internationalization.

ProChile is the institution that stems from the Ministry of Foreign Relations of Chile, which is in charge of promoting the country's goods and services exports. This institution, mainly through competitions, offers the opportunity to participate in international video game fairs and trade missions, receives direct financial support, helps setup business meetings, and gives guidance for establishing offices abroad.

In 2013, Chile became an official chapter of the International Game Development Association (IGDA), the largest nonprofit association in the world supporting game development and training.

The Federation of Video Games of Latin America (http://www.latamvgfederation.org/) was founded by the major Latin American associations of video game developers and represents the firms, studios, and business persons dedicated to the development, promotion, and growth of the industry.

Videogames Chile A.G. (VGC) is the Chilean Videogame Developers Association. It represents approximately 85 percent of all game developers in Chile and was created to promote video game development, protect the local industry's activities, generate awareness, and create long-lasting relationships with other governmental and nongovernmental institutions as well as private actors relevant to the local and global market.

There are three main events that take place in any one year, starting with VGChile's Checkpoint (for developers), Chile's Videogame Week (for prospective developers), and, lastly, FestiGame (for end-users and consumers). Details for over forty Chilean companies can be found at http://www.videogameschile.com/companies.

Sebastián González Canepa

See also: Argentina; Brazil; Colombia; Uruguay

Further Reading

Federation of Video Games of Latin America website. Accessed September 6, 2020. Available at http://www.latamvgfederation.org/.

Inter-American Development Bank. *Video Games, More Than Just a Game: The Unknown Successes of Latin American and Caribbean Studios*. 2020. Available at https://publications.iadb.org/publications/english/document/Video_Games_More_than_Just_a_Game_en.pdf.

VGChile website. Accessed September 6, 2020. Available at http://www.videogameschile.com.

China

Video gaming is an integral part of youth consumption and cultural industry in China, which is now one of the largest and fastest-growing game markets in the world. As of 2017, the population of game players in China had reached 580 million, and gaming has become one of the most lucrative sectors in China's cultural industry. Although China is not a new market—its history of video games can be traced to the 1980s—gaming in China is far from being mature and is characterized and influenced by piracy and state control.

China is a superpower of game piracy, being the world's largest supplier, consumer, and exporter of game piracy. Game piracy has two main forms: game software piracy and digital piracy. *Game software piracy* refers to the making of pirated game CD-ROMs or cartridges without acquiring the copyrights. Pirated software is sold about twenty times cheaper than its licensed counterpart; a Wii U or PS3 game is now sold for as little as RMB 8 (USD 1.16) in China. *Digital piracy* is the downloading of free games from unlicensed game websites. From the 1980s to the early 2000s, pirated game software had been the main form of game piracy. In the 2000s and 2010s, the rise of digital piracy has caused the decline of game software piracy.

From day one to the present, the entire game market in China has been dominated by piracy. Most players have never purchased licensed software. As a result, game manufacturers in Japan and the United States have basically given up on the Chinese market. The prevalence of piracy is one of the key factors for the boom of online games in China. Because home console–based games, home computer games, and handheld games cannot generate much revenue due to piracy, online games and mobile games, which are piracy-free by nature, have become the only area that both Chinese and overseas game manufacturers focus on developing and marketing. Internet cafés and home computers are the most important means for online gaming. Internet cafés are extremely popular among students and young people for their affordability and interactivity. Mobile gaming is a national leisure for all ages, having occupied about 60 percent of the market share in gaming in China.

萌萌打
CUTECUTEHIT
SpongeBob

Children playing on a children`s video game show in Shenzhen, China. (Waihs/ Dreamstime.com)

China has very tight control over gaming, and all imported games are subject to state censorship. Many are banned because of problems in content (such as sex, violence, bad taste, discrimination, and unwanted social behavior) and ideology (such as defaming the image of the Chinese troops, distorting history, and undermining China's sovereignty and territorial integrity). For example, *Hearts of Iron* (2002), a wargame about World War II, was banned because it depicts Tibet and Manchuria as independent nations and Taiwan as a Japanese colony. Although the background of the game is historically accurate, the Chinese authority accused it of "distorting history and damaging China's sovereignty and territorial integrity" (Egenfeldt-Nielsen, Smith, and Tosca 2008, 140). Sometimes even the importation of game hardware can be blocked by Chinese authorities on the grounds that its technology can be misused. All these measures are meant to not only control the cultural activities and thinking of the people but also to protect China's domestic market from foreign games.

Censorship has served as a kind of trade barrier. It usually takes a long time for an imported game to go through the screening. When an imported game is finally approved and ready to launch in China, its pirated software is usually everywhere in the market. Many imported games are required to have their content edited as a condition for approval. This is a time-consuming and costly exercise. To make it worse, players do not like the edited versions, and thus they turn to the unedited pirated versions. While censoring and restricting imported games, the Chinese authority promotes domestically made games to protect the Chinese market. China used to import online games; Korean games in particular occupied the lion's share of the Chinese market in the early 2000s. Nowadays, playing Chinese online games has become the mainstream form of game consumption in China, and the market share of imported games in China has been declining.

Piracy and state control of gaming in China have created a strong sense of disagreement and frustration among game manufacturers in Japan and the United States. If China does not make progress in cracking down on piracy and opening its market, international game trade friction will intensify, and China will not be accepted as a full member of the global gaming community.

The development of gaming in China has been incredibly fast but somewhat unbalanced. The problem of piracy has forced game manufacturers to develop nothing but online games and mobile games. The Chinese government is sending confusing messages to the game industry. It has set the development of the Chinese game industry as a state policy but has very tight control over game content. As a result, Chinese games are criticized for lack of originality and thus are less successful when exported. Online game centers are subject to frequent state surveillance, criticism, and crackdown. And the social image of gaming remains somewhat negative. On August 30, 2018, a new state regulation was issued to prevent game addiction and restrict new games. The problem of the social acceptance of gaming will definitely have an adverse effect on game culture in China.

Benjamin Wai-ming Ng

See also: Hong Kong; Piracy in China

Further Reading

Egenfeldt-Nielsen, Simon, Jonas Heide Smith, and Susana Pajares Tosca. *Understanding Video Games: The Essential Introduction*. New York and London: Routledge, 2008.

Fung, Anthony Y. H., and Sara Xueting Liao. "China." In *Video Games around the World,* edited by Mark J. P. Wolf, 119–135. Cambridge, MA: MIT Press, 2015.

Ng, Benjamin Wai-ming. "Video Games in Asia." In *The Video Game Explosion: A History from PONG to PlayStation and Beyond*, edited by Mark J. P. Wolf, 211–222. Westport, CT: Greenwood Press, 2007.

Xianhui Chie, and Barry Yip. "Mobile Games in China." In *Mobile Gaming in Asia*, edited by Dal Yong Yin, 173–192. New York: Springer, 2017.

Cinematics. *See* Cutscenes

Cinematronics

From the mid-1970s to the late 1980s, Cinematronics presented an alternative to the ubiquitous bitmapped graphics that had dominated video games since the arrival of *PONG* (1972). Over time, the resolution of video game graphics moved ahead by incorporating smaller and smaller pixels, eventually becoming equal to the resolution of broadcast television and, in time, beyond that. However, in the 1970s and 1980s, video games were unable to offer anything but images made of noticeably large blocks of light. Cinematronics changed that by replacing pixels with smoothly moving lines of light called *vector graphics*.

In 1975, in the desert of the El Cajon Valley, near San Diego, California, Jim Pierce, Dennis Parte, and Garry Garrison came together to become the founding owners of Cinematronics Inc. This particular grouping was soon replaced by Pierce, "Papa" Tom Stroud, and Stroud's sons Tommy and Dave. The latter two were responsible for sales, and their father was an experienced veteran of the coin-operated amusement business. Cinematronics' first game for sale was *Flipper Ball* (1976). Like many Cinematronics games to come, it was a "kit" game, purchased and assembled by Cinematronics rather than having been created within the company. Their next game was *Embargo* (1977), the first original Cinematronics game. It was created by Rob Shaver, a Cinematronics technician who left the nascent game industry shortly after *Embargo* to work for Motorola as a software engineer. His game was clever and simple, but most important, it made money for Cinematronics.

In 1976, with a license from the Massachusetts Institute of Technology (MIT) to produce a commercial version of the laboratory game *Spacewar!* (1962), Larry Rosenthal, a recent graduate of MIT, began looking for a manufacturer to build and sell his vector game *Space Wars* (1977). He was turned down by nearly every video game manufacturer he approached, largely because he was asking for an unheard of remuneration of 50 percent of revenues on every game sold. However, one company desperate enough to make that agreement was Cinematronics. The collaboration was a huge success for both parties, but even though they were very happy with their share of revenues from *Space Wars*, Pierce and Stroud were not happy with their arrangement with Rosenthal. In turn, Rosenthal felt that he was not receiving the remuneration he felt he deserved. One night, Rosenthal and Cinematronics sales representative Bill Cravens removed all the software and hardware Cinematronics used to create vector-based games. Fortunately for Cinematronics, an observant technician kept duplicate documentation that allowed the plundered company to continue on. With these, the Cinematronics technical team created custom sound boards, software tools, game controllers, and upgrades to Rosenthal's original hardware, making it possible to once again create new games for Cinematronics.

The first of the post-Rosenthal titles was the two-player shooting game *Starhawk* (1977), designed and programmed by Tim Skelly. Visually inspired by the trench sequence from *Star Wars* (1977), it sported a somewhat postmodern touch. If not destroyed soon enough, a spaceship attacked the digits of the player's score. *Starhawk*'s sales were strong enough to keep the company alive, and Skelly soon followed up with *Sundance* (1979), an oddity that challenged its players to capture sparkling balls of light. It had a vertical screen and a dual in-line parallel (DIP) switch that could be set to display Japanese rather than English, the only game that Cinematronics ever made with a feature of that kind.

In 1978, rather than compete head-to-head with Rosenthal's new company, Vectorbeam, Cinematronics chose to purchase the company outright. Based on the two companies' production schedules, Vectorbeam's nearly finished game *Tail Gunner* (1979) was manufactured at Cinematronics, and shortly after, *Warrior* (1979) was released as a Vectorbeam title, though it had been created at Cinematronics. The company did well during the late 1970s and early 1980s, partly because of its programming and design team of game developer Tim Skelly and technician Scott Boden, who would soon become a game designer in his own right. Additional games from the pair included *Rip-Off* (1980), *Star Castle* (1980), *Armor Attack* (1980), *Boxing Bugs* (1981), and *Solar Quest* (1981). Some projects never made it into production, like *Boxing Bugs* (1981), which Boden began as a castle defense style of vector game but was turned into a "cute" game at the request of management.

About that time, Skelly was recruited by the game company SEGA, which was looking for experienced vector game talent. His leaving prompted a lawsuit against him by Cinematronics, which was soon dismissed in court. From that time on, with the exception of engineer and programmer Rob Patton's vector game *War of the Worlds* (1982), there would never again be a homegrown game sold under the name Cinematronics. However, this is not to say that the company ceased to build and sell video games; Cinematronics merely changed strategies. After *Solar Quest*, owners Jim Pierce and "Papa" Tom Stroud returned to their past, once again purchasing the rights to manufacture and sell games conceived by outside vendors. Because of economic factors, the company was often struggling; Cinematronics may have had no choice but to give up designing original titles. Or, at best, as in the case of the laserdisc games *Dragon's Lair* (1983) and *Space Ace* (1984), they became manufacturing partners with other companies, which was no small achievement for Cinematronics. The fad for laserdisc games was short-lived, but the revenue from those two games kept the company on its feet.

Cinematronics managed to stay alive through 1988, purchasing kits for whatever games it could afford. These included *Freeze* (1982), *Zzyzzyxx* (1982), *Jack the Giant Killer* (1982), *Brix* (1983), *Hovercraft* (1983), *World Series Baseball* (1984), *Express Delivery* (1984), *Cerberus* (1985), *Mayhem 2002* (1985), *World Series: The Season* (1985), *Power Play* (1985), *Danger Zone* (1986), *Red Line Racer* (1986), *Double Play: Super Baseball Home Run Derby* (1987), *Baseball the Season II* (1987), and the last title to be sold by Cinematronics, *Alley Master* (1988). Although many of these games were generic with anonymous authors, it is important to remember that each of these games was conceived by technicians, game designers, and developers who spent their time and imagination creating pastimes that would be, for many or a few, fun.

Tim Skelly

See also: Laserdisc Games; Vector Games

Further Reading

Skelly, Tim. "The Rise and Fall of Cinematronics." In *Before the Crash: Early Video Game History*, edited by Mark J. P. Wolf, 138–167. Detroit, MI: Wayne State University Press, 2012.

Skelly, Tim. "Tim Skelly's History of Cinematronics and Vectorbeam." *Giant List archive*, June 1, 1999. Available at https://dadgum.com/giantlist/archive/cinematronics.html.

City of Mesquite v. Aladdin's Castle, Inc.

City of Mesquite v. Aladdin's Castle, Inc. is a 1982 U.S. Supreme Court case regarding the access of minors to coin-operated arcade games. The City of Mesquite had implemented a licensing ordinance governing coin-operated amusement establishments. Under section 6 of this ordinance, the chief of police was required to assess whether a license applicant had any "connections with criminal elements." The advice of the chief of police along with that of the chief building inspector and the city planner would affect the city manager's decision regarding whether to grant a license. Denied applicants could appeal to the city council, but if the license was denied under the advice of the chief of police, the applicant would have to demonstrate good character. Under section 5 of the ordinance, no one under the age of seventeen was allowed to operate an amusement device unless accompanied by a parent or guardian.

In April 1976, the City of Mesquite exempted Aladdin's Castle, Inc., from section 6 of the ordinance as long as children under age seven were not permitted to operate coin-operated machines without a parent or guardian. Aladdin's Castle then entered into a long-term lease with the local shopping mall and began making arrangements to open an arcade. In August, the city manager refused the company's application for a license because the chief of police had stated that the parent corporation had connections with criminal elements.

Aladdin's Castle sued in federal district court, seeking an injunction against enforcement of the ordinance. The district court upheld section 5 but ruled that section 6 was unconstitutionally vague. Ultimately, the U.S. Supreme Court ruled that both sections 5 and 6 were unconstitutional, basing its decision on the First and Fourteenth Amendments of the U.S. Constitution as well as the Texas Constitution. The Supreme Court ruled that neither part of the ordinance met the rational basis test. Further, the Supreme Court ruled that section 5 violated the right to freedom of association and freedom of speech and the due process clause of the Fourteenth Amendment. With regard to section 6, the Supreme Court ruled that the ordinance violated the due process clause of the Fourteenth Amendment.

The U.S. Supreme Court's ruling in this case was a significant victory for operators who had struggled against city ordinances in many communities. The guarantee of access to machines for young gamers also had significant implications for manufacturers and operators, who saw youths as key customers. The ruling in *City of Mesquite v. Aladdin's Castle* curtailed efforts to limit youth access to coin-operated machines and weakened efforts to restrict the licensing of arcades and related businesses.

Challenges to youth access to games have persisted, particularly in regard to violent games. In subsequent court cases, including *Video Software Dealers Association, Entertainment Software Association v. Schwarzenegger et al.*, courts have upheld the guarantee of youth access to games and have ruled that video games are protected as free speech. To date, the only age-based limitations on game access are the quasi-legal limitations instituted through the Entertainment Software Rating Board (ESRB).

Carly A. Kocurek

See also: Arcade Games; Censorship

Further Reading

"*City of Mesquite v. Aladdin's Castle, Inc.*, 455 U.S. 283 (1982)," *Justia, US Supreme Court*, 1982. Available at https://supreme.justia.com/cases/federal/us/455/283/.

Cornell Law School. "CITY OF MESQUITE, Appellant, v. ALADDIN'S CASTLE, INC." Available at https://www.law.cornell.edu/supremecourt/text/455/283.

Civic Engagement

Civic engagement can relate to video gaming in several ways. First, engagement with in-game communities is an essential part of some games; in other games, helping practices are an essential part of the game. In both cases, games can be designed to foster civic practices. Second, players may form communities within certain games or around certain gaming practices and become involved in civic activities in this way. Third, players may use gaming toward specific civic-minded goals, such as fund-raising for nonprofit organizations or specific causes, or developers may use a game as a medium for protest or civic engagement.

In the first case, games may cultivate in-game civic engagement. Games structured to encourage or demand civic engagement may require players to form communities, develop community guidelines, and engage in civic practices, such as community problem-solving and assisting other community members. A game can encourage specific desirable behaviors or invite thought about issues of community importance. Marsha Kinder's *Runaways* (1996) is an experimental game meant to encourage players to explore categories of personal, cultural, and historical identity and what these categories might mean. Educational games, in addition to teaching topic-specific knowledge in geography, history, or math, may also deliberately model civic practices.

Diverse games, however, include helping other players as an imperative (see Cooperative Gameplay). The study "The Civic Potential of Video Games" (2008), by the Civic Engagement Research Group at Mills College, suggests that youth who play games in which they engage in civic behaviors are more likely to make civic and political commitments, such as volunteering, participating in protests, fund-raising, and having an active interest in politics. The type of game does not negate this effect; for example, the game *Halo: Combat Evolved* (2001) is held out as an example of a game that models helping practices.

In the second category of civic engagement, related to the formation of in-game communities or game-related communities, players can directly shape the gaming community in which they participate through simple civically oriented actions, such as helping other players or forming groups of like-minded players. Community-oriented games predate video gaming, and some similar elements are evident in role-playing games (RPGs) and team-based games. The development of multiuser domains (MUDs) precipitated the formation of similar social structures within video game environments. Massively multiplayer online role-playing games (MMOPRGs) such as *Ultima Online* (1997) and *World of Warcraft* (2004) serve as two of the most famous examples. Events such as community meetings, festivals, protests, and even funerals have become part of MMOPRGs.

Communities may also develop outside of in-game activity. Many game companies encourage types of communities by supporting message boards or other online community spaces that enable players to communicate outside of games. Publications or websites can serve as a home base for a specific subset of the gaming community. For example, the nonprofit organization I Need Diverse Games produces media across multiple platforms, participates in conventions, and generally works to improve diversity in the games industry and in-game representation through services such as a jobs board and a Game Developers Conference scholarship program. Other networks of gamers, like the long-running Twin Galaxies, help organize tournaments and maintain high scores.

Third and finally, games may be used to address specific community or social issues. Gamers and artists have used video games as a site of protest for issues related to a game's subject or intervened in gameplay practices. For example, Anne-Marie Schleiner developed *Velvet-Strike* (2002) as a response to *Counter-Strike* (1999), a first-person shooting game she enjoyed playing. *Velvet-Strike* is a protest modification to *Counter-Strike* that allows players to alter the game by placing antiwar graffiti skins on the walls, ceilings, and floors of the game. Schleiner also developed a list of "recipes" outlining tactics protestors could use to alter gameplay by playing against the game's assumed antagonists. Another protest that began in March 2006 by Joceph DeLappe addressed the U.S. Army recruiting game *America's Army* (2002). Under the username "dead-in-iraq," DeLappe would log into the online game and type in the name, rank, and date of death of service persons killed in the Iraq conflict, continuing this action until he was killed in-game and then resuming when he was reincarnated. Games have also been developed to address particular areas of civic concern, such as fake news, climate change, street harassment, and other issues.

Organizations of gamers and game companies have also engaged in civic actions such as volunteer work and fund-raising, including through gaming-related efforts such as gaming marathons. Child's Play Charity, which provides games, toys, and books for patients in children's hospitals worldwide, describes itself as "a community-based charity grown and nurtured from the game culture and industry" and uses the tagline "Gamers give back." Launched in 2003, Child's Play has donated millions of dollars' worth of items, many of them paid for through the fund-raising efforts and donations of gamers. Game marathons usually rely on individual organizers and are not officially affiliated with the relevant game companies; marathoners may collaborate directly with the organization for which they are raising funds. Marathons have raised funds for a variety of nonprofits, including Big Brothers, Big Sisters, the American Diabetes Association, and others. Games played have included *Super Mario Bros.* (1985), *Metroid* (1986), *The Legend of Zelda* (1987), and *Mega Man* (1987), which is reflective of a tendency to marathon using long-running game franchises with a large audience. Also noteworthy is the Desert Bus for Hope marathon, which uses the unreleased SEGA minigame *Desert Bus* (1995), in which the objective is to drive a bus in real time from Tucson to Las Vegas.

Carly A. Kocurek

See also: Game Modifications; Reception Theory

Further Reading

Child's Play Charity website. Accessed September 6, 2020. Available at http://www.childsplaycharity.org.

Desert Bus for Hope website. Accessed September 6, 2020. Available at http://desertbus.org.

Kahne, Joseph, Ellen Middaugh, and Chris Evans. "The Civic Potential of Video Games." Civic Engagement Research Group at Mills College, 2008.

Wu, Jason, and Joey J. Lee. "Climate Change Games as Tools for Education and Engagement." *Nature Climate Change* 5 (2015): 413–418. Available at https://www.nature.com/articles/nclimate2566.

Co-Creativity

Co-creativity is a term used to refer to player practices that go beyond the playing of a video game and result in new productions, such as game modifications, skins (see Game Modifications), Let's Play videos, or Machinima videos. Co-creativity is a way to understand the ways in which the creation of a game is often shared between the actual paid game developers and the players of a game. This results in a mutually beneficial relationship between the player and the developers.

The term *co-creativity* was introduced to video game studies by John Banks in 2002 and further elaborated by Sue Morris (2003) and Dovey and Kennedy (2006). It acknowledges the players' influence on professional game development and suggests that players' productions and knowledge can be used in the design of new games or embedded in existing games. For instance, game developers can integrate player-made modifications into their products or simply develop their games based on the discussions of player communities. Players' work can also be considered as a source for innovation and experimentation for official game development because the industry itself is constrained by marketing, censorship, and financial considerations, whereas players, such as modders, are free to test and try out new, innovative aspects of games. Players' involvement in beta testing, then, is a more formal mode of co-creativity.

In many cases, such co-creativity also adds to the monetary value of a game as a retail product. Thus, the concept of *playbour* has been introduced to cover the free player labor that contributes to the profits of game companies (Kücklich 2005). Co-creativity is a controversial topic because it is usually only the developers who profit from the collaboration, although players acquire peer recognition, skills, more enjoyable play, potential job opportunities, and other immaterial benefits.

Although some forms of co-creativity feed ideas directly into commercial game development, other forms can largely remain within the player communities. These practices may inform or help in gameplay (e.g., walkthroughs and online databases such as Wowhead or League of Legends Wiki) or work as separate productions (such as Let's Play videos). These can be considered as co-creative practices because the gameplay experiences of other players are meaningfully altered through the use such aids.

What kind of co-creativity players participate in depends not only on their individual interests and skills but also on the genre and type of game. Some games offer ready-made tools for co-creative contribution, such as online discussion forums or modification tools. Some types of games integrate aspects of co-creativity into the game itself, thus blurring the line between actual gameplay and co-creativity. For instance, *The Sims 3* (2009) and *The Sims 4* (2014) include the possibility of sharing characters, items, and worlds with other players. As part of *The Sims* modding, players also take a significant role in localizing a games' content for a new cultural context. *The Sims* modders often create and share furniture, clothes, and other items that add cultural diversity and specificity to the games. These may vary from local artists' paintings and unique, branded furniture to religious symbols and festival decorations (Wirman 2013).

Players' contributions and innovations thus help in further developing the game for other players. A number of casual games that were popular on social software websites such as Facebook in the late 2000s were more extreme in their flexibility in regard to players' innovation. *FarmVille* (2009), for instance, remained in beta mode nearly two years and is constantly developed according to new requests and ideas from players. Steam's Early Access model builds on player feedback in the latter stages of development and allows players to test out nonfinalized designs. WeChat games such as *Jump Jump* (*Tiao Yi Tiao*, 2018) and other social media games heavily rely on user networks in gaining new players through viral marketing.

Co-creativity is an umbrella term for a variety of practices that are also approached from the points of view of fandom, hacking, and the tactical use of games. Accordingly, the various forms of player productivity are described as *fan art*, *mod arts*, and *tactical arts*. Other synonymous and overlapping terms are *custom-content* and *user-generated content* that are primarily used by the industry. Furthermore, the idea of "prosumers" (Toffler 1980) refers to this merging of producer and consumer roles in terms of creativity and innovation. In recent years, being a video game *content creator* has turned into a professional career possibility, where Livestreamers and Let's Players alike are able to sometimes achieve lucrative incomes by being a player co-creator.

Hanna E. Wirman

See also: Game Modifications

Further Reading

Banks, J. "Gamers as Co-Creators: Enlisting the Virtual Audience—A Report from the Net Face." In *Mobilising the Audience*, edited by M. Balnaves, T. O'Regan, and J. Sternberg, 188–212. Brisbane, Australia: University of Queensland Press, 2002.

Dovey, J., and H. Kennedy. *Game Cultures*. Maidenhead, England: Open University Press, 2006.

Kücklich, Julian. "Precarious Playbour: Modders and the Digital Games Industry." *Fibreculture* 5 (2005). Available at http://journal.fibreculture.org/issue5/kucklich_print.html.

Morris, S. "WADs, Bots and Mods: Multiplayer FPS Games as Co-Creative Media." In *Level Up Digital Games Research Conference Proceedings*, edited by M. Copier and J. Raessens. Utrecht, Netherlands: University of Utrecht and DiGRA, 2003.

Toffler, Alvin. *The Third Wave*. New York: Morrow, 1980.

Wirman, Hanna. "Playing by Doing and Players' Localization of *The Sims 2*." *Television & New Media* 15, no. 1 (2013): 58–67.

Codemasters

Codemasters, founded in 1986, is a prominent British game development and publishing company located in Warwickshire, United Kingdom. Publishing mainly racing games, Codemasters is home to a range of popular racing franchises, including the *Dirt*, *F1* (*Formula 1*), and *Grid* series. The company currently has four studios across the globe, located in Birmingham (United Kingdom), Cheshire (United Kingdom), Kuala Lumpur (Malaysia), and India. Their main campus is situated in Southam, United Kingdom.

Codemasters was founded by brothers David and Richard Darling following a successful early start in the games industry. From their youth, the brothers exhibited a keen interest in games, coding original games and clones of popular titles on the Commodore PET and VIC-20 computer with school friend Michael Heibert. After placing an advertisement in *Popular Computing Weekly*, as their former company Galactic Software, they caught the attention of publisher Mastertronic. They began to create budget games for the publisher, accumulating a wealth of £200,000 by the ages of sixteen and seventeen, which led to the genesis of Codemasters. With the help of their father, Jim, the brothers left Mastertronic and set up their own studio in a small industrial unit in Banbury, Oxfordshire.

In 1986, Codemasters released its very first game, *BMX Simulator*, a sports arcade game for the Commodore 64, which was later ported to other home computers. In 1990, alongside game development, Codemasters designed cheat code cartridges for popular consoles called Game Genies, distributed by Camerica and Galoob. These cartridges hacked the code in Nintendo titles, providing players with different abilities that varied game to game as well as unlocking areas usually inaccessible in normal playthroughs. The first Game Genie was made for the Nintendo Entertainment System (NES), which was subsequently met with legal action from Nintendo, but the case fell through as the courts ruled in Game Genie's favor.

While the majority of recent releases have been focused on racing titles, Codemasters has produced games for other genres. In 2009, Codemasters became the main publisher for the *Leisure Suit Larry* series, a popular adult-themed game series. It has also released adventure games such as *Overlord* (2007) and tactical shooters such as *Operation Flashpoint: Dragon Rising* (2009), part of a small franchise produced by Codemasters.

In 2016, Evolution Studios, developer of the now concluded *DriveClub* series, was acquired by Codemasters after being shut down by Sony. This resulted in the formation of Codemasters Evo. However, after the poor reception for their game *ONRUSH* (2018), more developers were laid off, and the division has been dormant ever since. The remaining interest for Codemasters was sold to Balderton Capital in June 2007 by the Darling family for an estimated £80 million (Games Industry International 2007; Johnson 2008). Shortly after, both brothers were awarded CBEs in 2008 for services to the computer games industry. David Darling is now CEO of Kwalee, a mobile game developer located in Warwickshire, United Kingdom. As of June 2018, Codemasters is now a public company.

Courtney Blamey

See also: United Kingdom

Further Reading

Games Industry International. "Balderton Capital Buys Out Founders of Codemasters, Company Receives £50m Funding from Goldman Sachs." Gamesindustry.biz, June 14, 2007. Available at https://www.gamesindustry.biz/articles/balderton-capital-buys-out-founders-of-codemasters-company-receives-pound50m-funding-from-goldman-sachs.

Hunt-Stevenson, Jamie. “Codemasters Break Down the Red Bull Ring in GRID Season 2.” RedBull.com, February 27, 2020. Available at https://www.redbull.com/ca-en/grid-season-2-red-bull-ring.

Johnson, Bobbie. “David Darling: From Games to Robotics.” *The Guardian*, May 1, 2008. Available at https://www.theguardian.com/technology/2008/may/02/darling.

Cognition

Much ink has been spilled deliberating over whether video games make people more or less intelligent. The mainstream media tend to lean more toward the former and science more toward the latter. Some scientific research, for instance, tells us that video game play actually increases our ability to focus, training us to ignore distracting tasks with the main one constantly in sight (Gackenbach 2006). Other scientific research argues that video game play can increase motor coordination and perceptual speed reaction skills, spatial visualization capacity, and even reflective decision making (Greene 2003; Greenfield and Cocking 1996). As much as video game players would love to have science prove that they are becoming smarter, it is still far from conclusive; the mind’s response to the environment remains too complex for science to declare any kind of direct correlation.

What we do know for certain is that playing video games activates all variety of cognitive processes: from causal and counterfactual reasoning to metacognitive reflection, spatial visualization, memory function, and language capacity. Along with the activation of the corresponding neural network centers, there is a more general triggering of our emotional and cognitive systems in the making and playing of video games.

THE NEUROBIOLOGY OF VIDEO GAME PLAY

The constant stream of sensory stimulation and information (sound and image primarily) is first processed by our emotion system, or what biologists call the limbic system, which includes the hypothalamus and amygdala. When marauding zombies try to get you in *Resident Evil* (1996), rabid mutants gnash at you in *Left 4 Dead 2* (2009), or monsters crawl after you in spacecraft cavities in *Dead Space* (2009), they activate our limbic system, our fight-or-flight response mechanism. We experience the reflex emotion of fear, and the adrenaline kicks in. However, our brains are equipped with a conceptual filtering capacity, *grosso modo*; it is a prefrontal cortex response that allows us to distinguish between the real and unreal or between fiction and nonfiction events. So when those monsters attack, the sensory stimulus is prefiltered as fiction by the emotion system and then resolutely distinguished as such by our reason system, or the executive cortex, which includes the orbitofrontal, prefrontal, anterior cingulate, and motor cortex, for instance. The executive brain sets in stone, so to speak, this evaluation of the monster as unreal. All the while, another monster has jumped out at you that you must destroy, once again triggering the emotion system with its respective reflex emotion, its prefiltering of real versus unreal, and its signaling of the executive brain for confirmation.

The emotion and executive brain trigger an appropriate body response, and the body reaction in turn can intensify the emotion experienced. The well-seasoned video game player seamlessly toggles the controller to control the character movements as if they were the player's own. When playing a survival horror game like *Dead Space*, the player reacts with surprise, shock, and horror and moves the character's body to survive, but always in an "as if" way—as if the flesh-eating monsters were real yet *knowing* all the while that they are fictional.

Although the executive system reaffirms what has already been processed by the emotion system, a residual fight-or-flight reflex emotion remains in the latter system; the executive system is not all-powerful in this sense. It does not erase the initial reflex emotion already experienced, and game players would not want it to. Players not only get that adrenaline rush but also that wash of feel-good neuropeptides, such as oxytocin and dopamine.

There are important nuances that differently inflect the way people cognitively and emotionally experience video games. First, the more one plays video games, the more the executive system is prepped and primed to override the emotion system. Without emotion reflex and reward, there is little reason to play again, or at all. Hence, designers are constantly working to create games with cognitive challenges and emotional rewards; they are striving to up the ante on what has come before. Second, from the day we are born, our reason system, or executive brain, grows in conjunction with an already fairly developed emotion, or limbic, system. In other words, if a young child had the motor skills to play a horror shooting game, given the underdeveloped reason system and the overdeveloped emotion system, there would not be the kind of emotion override that a teen player would have. The child would most likely be scared in a nonpleasurable way (Subrahmanyam et al. 2000).

COGNITIVE MECHANISMS AT WORK IN VIDEO GAME PLAY AND DESIGN

Like all humans, video game players have developed brains within a natural and social world. From the day we are born, we begin growing our capacity for causal, counterfactual, and probabilistic thinking, doing, and behaving in the world. In our constant interaction with the natural (organic and inorganic) and social (people and institutions) world, we imagine and work through in our minds possible and probabilistic outcomes to actions and actually do the work to modify our environments or our expectations. As we modify our natural, personal, and social environs, we also get to know our own abilities better.

All this results from the healthy growing of our causality mechanism (in which we learn that A leads to B, then to C, and so on) and our counterfactual process (whereby we learn that *if* I do A, I will achieve B and not C or D). Namely, these capacities allow for the following: *if* A produces or is the cause of B, we can formulate a hypothesis that A might (as a possibility) *cause* C. Or, conversely, we can move from effect toward the cause: maybe the cause of C is A.

Because we grow in this capacity to formulate or perceive relations of causality, we therefore also automatically possess the capacity to perceive and formulate counterfactual hypotheses, arguments, and thoughts generally. We also grow and sharpen our capacity to create maps—of the human (social) and physical (natural) world—and by doing so, we learn to create new maps within the chain that allow us to consider new possibilities and formulate plans with probabilistic outcomes for what our situation will be in the world in the future.

These cognitive mapping mechanisms (comprising causality, counterfactuality, and probabilistic reasoning) feed all our story-making activities, including the making of counterfactual characters and places in video games. These innate mapping capacities grow in ways that express themselves in the making and playing of video games.

When we play (or design) video games, we exercise the same cognitive mechanisms (causal, counterfactual, natural, and social mappings) already at work in young children who playfully invent storyworlds populated with imaginary companions and characters. When we follow the logic that a video game blueprint sets out for us, we exercise these causal, counterfactual, and probabilistic processes—and to specific ends: to experience fear, shock, or horror while playing and to feel happy, satisfied, and elated in the win.

Video games are a particular expression of our everyday causal and counterfactual mechanisms that we use to map our physical and social worlds. Playable and non-player characters (NPCs), like the imaginary companions of childhood, present us with ways that we might be and act—or that others might be and act. Of course, different games present different opportunities to exercise our causal and counterfactual mapping capacities. Some may demand that we exercise more of our mapping of the natural world (as in *Call of Duty* [2003]). Others may demand that we use these mechanisms in the mapping of a social world, as in many massively multiplayer online role-playing games (MMORPGs).

When we play video games, we do so within a real-life safe zone. It is within this safety zone that our emotion and executive system can work together in ways that allow us to feel all sorts of emotion—even to relish in the attack of a horde of zombie invaders. We can do so because our brain knows that it is safe to do so. If there were real zombies *really* attacking, the exercise of our causal and counterfactual mapping would not be enjoyable, as it is in the guarded, controlled, and purposeful play of video games.

Video games are not entirely like childhood storyworld play. Each game has its respective algorithmic constraints that put a limit on who we can be and how we can act. Even if the game's boundaries and levels seem limitless, we are *following* the design of another person during our play.

The causal and counterfactual mechanisms that allow us to plan, think, and act in new ways are also the ones that game designers use to create new and innovative video game blueprints that vitally engage the player's causal and counterfactual mechanisms. Game designers can do so because these mechanisms help grow in all of us the sophisticated metarepresentational system of language, including the so-called language of computer programming. These basic cognitive processes, then, one way or another, are at work in the neuromechanical auditory and visual design of video games.

Video game designers are constantly imagining events and minds of invented characters who use causal and counterfactual mechanisms in their own encounters with the natural and social world. Designers are therefore not only using these basic cognitive mechanisms to imagine and create the video game blueprints but are also seeking ways in which the characters in the video game worlds are themselves using these capacities in one way or another. Moreover, they are doing this with the game player in mind: the game designers are anticipating what the player will feel and think when *playing* characters that feel and think. Video games rely on the player's *doing* (purposefully directed movement and action-oriented gestures) to intensify the brain's immersion in the designers' counterfactual blueprint, and this triggers the cognitive and emotive payoff.

SPECIFIC EXPRESSIONS OF OUR COGNITIVE MECHANISMS

MMORPGs require that players exercise causal, counterfactual, and probabilistic thinking by creating new versions of themselves, and this can take place at any time of day and alongside characters played by gamers all over the world. For instance, as a flesh-and-blood English-speaking Anglo-American male player, one could choose to be a patois-speaking African American female character. MMORPGs are worlds with recognizable natural laws—you cannot walk through a wall, for instance—and the emphasis is on the social; the player constantly exercises cognitive mechanisms to map social situations and encounters with constantly shifting codes of conduct (as in games such as *Ultima Online* [1997], *EverQuest* [1999], *Dark Age of Camelot* [2001], *Final Fantasy XI* [2002], *Star Wars Galaxies* [2003], and *Prius Online* [2008]).

Puzzle games are designed to trigger our causal and counterfactual mechanisms as expressed in puzzle solving and algorithmic computation. *Professor Layton and the Curious Village* (2007) as well as *Professor Layton and the Diabolical Box* (2009) are visually appealing (Japanese Ghibli art) and have a basic story (a romance set in Victorian England), but the main purpose is for the player to exercise puzzle-solving cognitive mechanisms. The strategy game also belongs to this category, albeit it is puzzle solving put to building and managing entire worlds (as in *SimCity* [1989], *Civilization* [1991], *Spore*[2008], and *Dawn of Discovery* [2009]). Role-playing games (RPGs) lean heavily on the use of our counterfactual mechanism. In an RPG, players build up their virtual characters through the accumulation and selection of equipment and skills. Shooting games require that we exercise more of our causal basic mechanisms (and our perceptual and motor cortex) as we learn that killing A will lead to B, to C, and then to the end of the game.

The design and playing of video games more or less emphasizes the different ways we use our causal and counterfactual thinking to map our natural and social world. And although video games are becoming more and more realistic, they still do not give the absolute total picture and are not a mirror held up to reality; the player still has to fill in the gaps in the counterfactual play.

Video game playing is not imagining in abstract; it is an imagining directed by the designers' programmed algorithms. This is the crucial difference to the counterfactual play of children. When a child hops along on a broomstick, this intensifies his or her imagining of the broomstick to be a horse. Although the imagining of the broomstick to be a horse is culturally conditioned by what the child knows and the child's experiences, it does not force the child to follow predetermined rules and options, whereas video games do require rules to be followed. Even when they are hugely varied and where the options (forking paths) are seemingly infinite, these are ultimately contained by the algorithm—those boundaries fixed by the creators of the game. Immersion in a video game often requires a constant use of induction, deduction, and abduction (educated guesswork) precisely because the game player has to make decisions according to options predetermined by the game. Many video games require a constant use of our causal, counterfactual, and probabilistic cognitive faculties to determine their rules and goals; other video games have their rules and goals laid out in the game manual and can be learned before they are played. However, in all cases, the player's imagination is necessary to fill whatever gaps are left and to enjoy a game's fictionality.

Frederick Luis Aldama

See also: Emotion; Reading Video Game Imagery

Further Reading

Carter, Rita, et al. *The Human Brain Book*. London: Dorling Kindersley, Ltd., 2009.

Gackenbach, Jayne. "Video Game Play and Lucid Dreams: Implications for the Development of Consciousness." *Dreaming* 16, no. 2 (2006): 96–110.

Greene, J. D. "From Neural 'Is' to Moral 'Ought': What Are the Moral Implications of Neuroscientific Moral Psychology?" *Nature Reviews Neuroscience* 4 (2003): 847–850.

Greenfield, Patricia M., and R. R. Cocking, eds. *Interacting with Video: Advances in Applied Developmental Psychology*. Vol. 11. Norwood, NJ: Ablex Publishing, 1996.

Subrahmanyam, Kaveri, Robert E. Kraut, Patricia M. Greenfield, and Elisheva F. Gross. "The Impact of Home Computer Use on Children's Activities and Development." *The Future of Children: Children and Computer Technology* 10, no. 2 (Fall/Winter 2000): 123–144.

Coleco

Coleco Industries, Inc., was an American manufacturer of toys and consumer electronics. Established in 1932 under the name Connecticut Leather Company, it initially specialized in leather and leather supplies before branching into plastics in 1956. In 1961, the company withdrew from the leather business and, by the late 1960s, became a leading manufacturer of above-ground swimming pools.

Coleco entered the video game business in 1976 with the Telstar line of game consoles. Fourteen models were produced within the next two years, most of them *PONG* (1972) clones based on the General Instrument AY-3-8500 chip or its derivatives. Of note is the Telstar Arcade (1978), the only programmable cartridge-based unit in the series. The distinctive triangular console could play shooting games, driving games, and *PONG*-type games, each side of the casing accommodating a dedicated controller (a light gun, a driving wheel and a gearshift, and paddles, respectively). Four cartridges were released containing fourteen games.

With its extensive product line, Coleco incurred $30 million in losses when the video game market crashed because of oversaturation with dedicated consoles (see Crash of 1977). The company decided to withdraw temporarily from the home console business and instead shifted its focus to LED-based handheld game units (such as the *Electronic Quarterback* or the *Head to Head* series of two-player sports games) and tabletop versions of arcade games (including *Galaxian* [1979], *Pac-Man* [1980], and *Donkey Kong* [1981]).

Coleco returned to the home console market in 1982 with the release of an 8-bit programmable console, the ColecoVision. It also began releasing games for the Atari VCS 2600 and the Mattel Intellivision, primarily conversions of popular arcade titles, such as *Donkey Kong* and *Zaxxon* (1982). In the same year, the company unveiled Expansion Module #1, which made the ColecoVision compatible with the extensive library of VCS cartridges, and the Coleco Gemini—a full VCS clone.

With the sales of the ColecoVision slowing down in mid-1983, Coleco focused on promoting its upcoming ADAM home computer. Introduced to the market in late 1983, the ADAM was available as a stand-alone system or a ColecoVision expansion module. Included in the price were a tape drive, printer, full-stroke keyboard, and built-in word processor. Although it was initially considered to be a highly promising product, the ADAM's future was sealed by design flaws and technical problems. The computer did not perform well in the market, and many of the units were returned because of malfunctions. The ADAM's failure severely weakened the company, which posted losses of $79.8 million for fiscal year 1984. The computer was discontinued in early 1985, having sold an estimated 250,000 units (Lewis 1985).

Despite the success of its Cabbage Patch Kids doll line, Coleco did not recover from its financial troubles. With debts of $540.3 million, the company filed for bankruptcy in July 1988. Most of its assets were acquired the following year by Hasbro, Inc.

P. Konrad Budziszewski

See also: ColecoVision

Further Reading

Baer, Ralph H. *Videogames: In the Beginning*. Springfield, NJ: Rolenta Press, 2005, 138–148.

Calip, Roger. "Is There Life after Cabbage Patch Kids?" *Business Times*, August 1987: 23.

Kent, Steven L. *The Ultimate History of Video Games*: *From Pong to Pokémon and Beyond: The Story behind the Craze That Touched Our Lives and Changed the World*. Roseville, CA: Prima, 2001.

Lewis, Peter H. "Peripherals: The Plight of Orphaned Computers." *New York Times*, January 8, 1985: C6.

McFerran, Damien. "Retroinspection: ColecoVision." *Retro Gamer* 73 (2010): 66–73.

ColecoVision

The Connecticut Leather Company was started in 1932 by Russian immigrant Maurice Greenberg. Greenberg originally supplied provisions to shoe repair shops and within a decade expanded his business to selling leather craft kits featuring famous characters, such as Mickey Mouse. During the 1950s, the company entered into the plastic pool industry, and as it moved away from leather goods into other products, it decided to abbreviate the company's name by taking the first two letters from each word in the original name to form the name by which it came to be known: Coleco. By 1962, Coleco had become the world's largest above-ground pool manufacturer and became a publicly traded company. The company transformed again when Coleco bought Canadian Eagle Toys and entered the toy business.

Coleco had much success with Eagle Toys' tabletop game *Rod Hockey* (1968) and as a result decided to pursue more entertainment games. Seeing the success of Atari's coin-op *PONG* (1972) and the home version of *PONG* in 1975, Coleco Industries, Inc., released a $50 home version of its own, the Telstar Arcade, in 1976. This unit completely sold out, and Coleco moved forward with several successful LED sports handheld games, such as the Coleco *Head to Head Football* (1980) and Coleco *Head to Head Baseball* (1982).

Coleco watched the success of the cartridge-based home console systems released by Atari and Mattel and followed suit by releasing the ColecoVision in August 1982, exactly fifty years after opening its doors. The unit sold for $175 and was packaged with the popular game *Donkey Kong* (arcade version, 1981; home version 1982). Just under a half million consoles sold during the ColecoVision's launch, and in less than three years, Coleco would sell more than six million units.

The ColecoVision was part of the second generation of video game systems, meaning that the game program cartridges had 32 KB of working memory. This increased memory over its adversaries, who used 2-KB and 16-KB chips, allowed Coleco to produce better graphics and sound than its competitors. Coleco had successfully filled the gap in the market by offering hardware that, as their box slogan boldly stated, “Plays like the real arcade game.”

Atari was releasing arcade game titles for its home system by porting its own arcade games and through exclusive licensing agreements with other coin-op manufacturers, such as Namco. As a result, Coleco partnered with other coin-op manufacturers, such as Konami, SEGA, Nintendo, and Universal, to port their game software to the ColecoVision console.

The ColecoVision used the Z8A central processing unit, the same CPU used in many coin-ops, the MSX, SEGA hardware, and several home computers of the time. This turned out to be a blessing concerning development by third-party publishers because games originally developed for other hardware could be quickly and easily ported to the ColecoVision.

Coleco made two controller peripherals for the ColecoVision: the roller controller, a trackball device similar to the kind used in the arcades, and a deluxe controller set referred to as the Super Action Controllers. Unique in design, each controller resembled the hilt of a sword, with the action buttons hidden behind the knuckle guard. This unique design allowed for privacy and shielded competing players from watching what button was pressed, a particularly useful tactic when choosing a pitch in *Super Action Baseball* (1983). A spinner dial, yet to be duplicated by another console controller, allowed for variable speed and quick changes in direction.

The ColecoVision also had a built-in expansion port crafted directly into the console housing, a first for a video game console. Although several different modules had been planned, only three distinct modules were released. The first expansion module allowed the ColecoVision to play cartridges made for the Atari VCS 2600. The ability for one system to play games designed for another console was a first for the game industry. It also prompted a legal battle with competitor Atari. The second module was a steering wheel that included a gas pedal to play driving games, such as the popular arcade game conversion *Turbo* (arcade game, 1981; Coleco home version, 1982).

The third module transformed the ColecoVision into a full-fledged computer, known as the ADAM, complete with a keyboard, cassette drive, and a daisy-wheel printer. Coleco was becoming a dominant force in the video game arena when, eighteen months after launch, the American video game market collapsed in the crash of 1983. The ADAM was to be Coleco’s solution and savior. Unfortunately for Coleco, the ADAM got off to a rocky start and never recovered. ADAM was plagued by a list of technical problems, the launch was delayed several times, and only ninety-five thousand units, as opposed to the five hundred thousand predicted, ever made it to consumers.

Following the disastrous release of ADAM in 1983, Coleco retreated from the video game market in 1984. Saved by the overnight success of the Cabbage Patch Kids, Coleco remained in business until the fad had passed, leaving the company overexpanded and unprepared. Hasbro bought the Coleco name in 1987, and the rights to the Cabbage Patch Kids now ironically belong to Mattel, Coleco’s onetime video game rival and manufacturer of the Mattel Intellivision.

Michael Thomasson

See also: Coleco

Further Reading

Forster, Winnie. *The Encyclopedia of Game Machines*. Utting, Germany: Gameplan, 2005.

Herman, Leonard. *Phoenix IV: The History of the Videogame Industry*. Springfield, NJ: Rolenta Press, 2017.

Sullivan, George. "Looking to the Future." *BLiP* (May 1983): 20–21.

Collecting Video Games

Collecting video games is very different from many traditional collecting hobbies. Books tell a single story; baseball cards feature a photo coupled with a few statistics to read; and salt and pepper shakers simply store and distribute spice. Few collecting hobbies offer the depth of interaction as do video games. A single video game can be played for hours, and certain genres, such as role-playing games (RPG), can be played for months with little or no duplication of events. Even classic games, with fewer screens and levels, are never the same game twice. Because most video games feature adjustable skill levels or multiple game-playing options, nearly anyone of any age can partake in the hobby.

Hardback book collectors search for first editions and printings by famous authors, and sports card collectors hunt for rookie cards. Collectors of video games do not share such challenges. For example, early video games by prominent programmers such as Richard Garriott and Shigeru Miyamoto do not command a higher value. Popular games had larger and multiple production runs to meet demand, are more plentiful, and are usually the most affordable. Most games are available for a fraction of their original retail price, meaning there is great value and fun to be found with little expenditure to start collecting.

Many collectible items become fragile over time, but early video game hardware and software have proven to be very stable and durable. In fact, older video game equipment will survive most modern-day video game gear because most were solid-state in design and contained no moving parts. The more modern the video game equipment, the more susceptible it is to failure due to mechanical problems, including technologies such as CD-ROM drives, motorized doors, liquid coolant, rubber belts, laser technology, and so on.

A particular sought-after game can be elusive. For some, the hunt becomes a game in itself. There are the obvious venues: flea markets, pawn shops, and local video game vendors such as GameStop. Popular online destinations include Good Deal Games (GoodDealGames.com), Digital Press (www.DigitPress.com), J2 Games (J2games.com), and eBay (ebay.com). There are also numerous video game conventions and swap meets around the country and the world, such as the

Midwest Gaming Classic, Video Game Summit, and Too Many Games. Perhaps the most popular among them is the Portland Retro Gaming Expo, which is usually held in Las Vegas.

For most collectors, the criteria that determine a game's value are completeness, scarcity, and condition. A single change concerning any of these factors can have a dramatic effect on a game's worth and collectability. Many consumers discard game packaging. As a result, video games present with their original boxes and paperwork, including any promotional paperwork originally packaged within the box (such as catalogs and registration cards), usually sell for more than double that of a loose cartridge. In some cases, the packaging is more valuable than the actual game itself; for example, the *Stadium Events* (1987) packaging alone sold for more than $10,000.

Games with lower production runs are more difficult to locate, and that can often drive the price up. Cartridges such as *Combat* (1977) for the Atari VCS 2600 and *Sonic the Hedgehog* (1991) for the SEGA Genesis are very common because they were packaged with their respective consoles, resulting in a lower value, as they are obtainable with little effort.

Grading the condition of a game and its accompanying items has no set formula. Labels that are pristine are far more desired than torn labels or labels with marker writing. Boxes that are not crushed or bent, those that contain bright and vibrant colors rather than those faded by the sun from sitting in a rental store's window, and those that are not otherwise damaged command more respect. Unopened games in their original factory packaging are very sought after in most cases. Furthermore, cartridges with clean integrated circuits (the part of a game that plugs into the console) or CD-ROMs that are scratch-free improve the odds of the game playing correctly as well as being cosmetically desirable.

In some cases, game genre can affect value and collectability. Sports games that are published year after year, such as games in the John Madden football franchise, rarely retain even a minute portion of their initial retail value. Story-driven games, such as role-playing games (RPGs), often cause an emotional response with players and collectors and as a result can be more desirable. Nostalgia can also be a motivating factor. Individual collectors may have a stronger appreciation for a certain generation of games, perhaps those from their own childhood.

Some collectors collect by system, organizing their games by console release and attempting to obtain every game released for a particular system. Some systems offer a greater challenge than others; for instance, collecting games for the Atari 7800 ProSystem is rather easy because it had a relatively small library of about five dozen games, all of which are fairly plentiful and easy to locate. Collecting for the Atari VCS 2600, however, is a massive undertaking; hundreds of different games were released by multiple publishers, in various quantities, through different distribution chains, in multiple international markets, with a variety of label and packaging variations. Other popular collecting options include collecting games by a particular publisher or of a favorite series, producer, artist, or genre.

A collector's physical location can also pose challenges. Most games are released within the North American and Japanese markets, but there are exclusive game titles released to select regions, such as the United Kingdom or Brazil.

Games sold in markets other than their original ones are referred to as *import games* and usually cost more abroad than in their native country.

Even domestically, finding a game in a particular region can be difficult. When the home video game industry began, there was no real distribution system in place; thus, many titles were easier to obtain in certain markets. For instance, Bally Astrocade games were manufactured in Columbus, Ohio, and were easier to acquire in the Midwest region.

Certain rare cartridges have fetched hefty prices, proving that video game collecting can be an investment. In the early 1990s, Nintendo staged several gaming tournaments, and perhaps the most popular was the thirty-city North American Powerfest Tour that allowed Nintendo fans to prove their skills using the specially designed *Nintendo World Championship* (1990) cartridge. The top ninety finalists were awarded a gray edition of the cartridge, and *Nintendo Power Magazine* also awarded an additional twenty-six *World Championship* cartridges in a contest. These cartridges were gold in color, similar to *The Legend of Zelda* (1986) cartridges common in circulation, and only a dozen have surfaced since 1990. Although most of the gold carts have sold for around $6,000 each, one sold to collector J. J. Hendricks for $17,500 in 2009. Another rare tournament cartridge, *Nintendo Campus Challenge* (1991), purchased by Rob Walters in 2006 for $21,100, is believed to be the only surviving copy because Nintendo often destroyed such material after the completion of a tournament.

In January 2001, a factory-sealed copy of *Stadium Events* (1987) sold for $22,806. The game was originally released in limited quantities (approximately two thousand) by Bandai before being recalled to be republished by Nintendo for use with the Power Pad peripheral and relabeled as *World Class Track Meet* (1988). In January 2011, a sealed copy of *Stadium Events* (1987) was successfully sold to another bidder for $22,800.

In 2010, a copy of *Air Raid* (1982), the first with an accompanying box, surfaced and sold for $31,600. Two years later, a complete version of *Air Raid* that included the box and the only known manual sold for a whopping $33,433.30. The auction results garnered a great deal of media attention and alerted another owner of the third known boxed copy of the game.

The highest recorded price ever paid for a single video game was $100,150 on St. Valentine’s Day in 2019 by a high-risk speculator betting that the game will increase in price in time to be sold for a profit later. The game was an original “sticker sealed” test-market release of the now classic *Super Mario Bros.* (1985) for the Nintendo Entertainment System (NES). Later reprints of the game are quite common and valued at around $40, by comparison.

Some games are released with the collector in mind. Known as limited editions (LE) or collector editions (CE), these special versions are manufactured in smaller quantities than the usual regular release and include bonus materials, such as audio soundtracks, art books, and figurines, and contain development material, such as “making of” videos. Collector editions are often presented in special packaging, such as a designer metal tin, often required to house the extra content.

Some collectors collect video game accessories in addition to video game hardware and software. Special controllers, such as driving wheels, light guns, trackballs, fishing rods, and musical instruments, like those used with *Guitar Hero* (2005), are also collectible. Supportive peripherals such as memory cards, rumble packs, faceplates, expansion memory, and link cables can also be added to any collection. Even a nonfunctioning apparatus, such as the SEGA Genesis SEGA Channel Adapter, or other obsolete equipment may be collected for completeness's sake. Many collectors also collect video game memorabilia. Tie-ins are numerous, encompassing items such as toys, promotional materials, retail displays, original art, and more, including the popular Super Mario bed sheets from the late 1980s.

Many enterprising individuals make their own homebrew games for obsolete systems no longer supported by the original console manufacturers. These games are also collectible and can be especially difficult to locate because they are usually manufactured in very limited quantities, normally less than a hundred copies per title. They are also not sold via retail establishments and are usually only available online from the original designers, from hobbyist websites such as Atari Age (AtariAge.com) and Good Deal Game's Homebrew Heaven (GoodDealGames.com), or at small retrogaming trade shows, such as the Portland Retro Gaming Expo. Homebrew games sold at a particular convention often sell out almost immediately and are only available for a few hours.

The number of games that a consumer purchases for a select gaming console varies from individual to individual, but sales statistics show that most patrons usually purchase fewer than ten titles per console. A serious game collector, however, amasses very large collections in the thousands. In addition to private collections, there are also professional and publicly collected works, including archives and museums. The world's first permanent video game exhibition, *Computerspiele*, opened in Berlin, Germany, in 1997. The International Video Game Hall of Fame and Museum collects video game coin-op machines, and *Videotopia* is a mobile exhibition that has been in such notable museums as the Franklin Institute and features both coin-op arcade games and home console video games. One of the more impressive collections is owned by the International Center for the History of Electronic Games (ICHEG) at the Strong National Museum of Play, which currently houses more than eight thousand video game items and is constantly expanding.

There are online organizations as well; the Video Arcade Preservation Society (VAPS) has thousands of volunteer members who compile locations of vintage amusement hardware encompassing more than seventy countries, and the Killer List of Videogames (KLOV) offers a database for coin-operated video games. Good Deal Games (GoodDealGames.com) and Digital Press (www.digitpress.com) compose and publish release lists of available software for more than sixty gaming consoles and also serve as gathering places for collectors to meet each another. Print resources, such as *Old School Gamer Magazine*, include value pricing in addition to various other information that may be beneficial to collectors.

Michael Thomasson

See also: CD-ROM-Based Games

Further Reading

Glenday, Craig. *Guinness World Records 2001: Gamer's Edition*. Indianapolis, IN: Brady Games DK Publishing, 2011.

Thomasson, Michael. “Let’s Retrogame Holiday.” *Hardcore Gamer* (Winter 2008): 34–41.

Colombia

Although video games were released worldwide during the 1970s, it was very rare to find them in Colombia at the time. In the early 1980s, arcades, mostly located in malls, were an important place for kids and teenagers, and their popularity ended in the late 1990s with the inclusion of home video game consoles in the Colombian market; they still exist, but not to the same scale. On September 29, 1996, Nintendo shook the market with one of the most powerful electronic entertainment machines, the Nintendo 64, and since then, the blast of video games and video game consoles has changed the course of history. Today, Colombia is the fourth-largest consumer of video games in Latin America, and the evolution of video game development there started not just with the joy of playing but the ability to create new worlds on your own.

It is possible to see the influence of that era in Colombian video games. Timba Studios’ *Puppet Kings* (2017) reminds one of *Arkanoid* (1986) and Atari’s *Breakout* (1976), and we can see traces of the thirty-two-year-old *The Legend of Zelda* franchise in games such as *Project Monolith* (under development) from C2 Game Studio. *El Chavo Kart* (2014), from Efecto Studios, is a Latin-American version of *Mario Kart* (1992), and the *Metal Gear Solid* franchise has inspired many Colombian games, including *Quantum Replica* (2018) from ON3D Studios. *CrisTales*, the soon-to-be-finished game by Dreams Uncorporated, is inspired by the Japanese role-playing games (RPGs) of the 1990s, along with many other games that have been released since the beginning of the industry.

Colombia’s own game industry started in 2004, with the founding of Immersion Games, a company that no longer exists but which opened a space that was not even considered by the chamber of commerce or even the government. Since then, the industry has grown into an emerging force that grows and becomes stronger throughout the country.

From 2010 to 2018, Colombia had the same government in power, the fifty-eighth president and the Santos government; this allowed discourse with the main industry players to continue, as a governmental initiative on the part of the Ministry of Technology created, in 2012, Colombia 3.0 (now called Colombia 4.0), a digital content summit that evolved to face the new challenges posed by the fourth industrial revolution and the transformation to the digital economy.

The meeting brought together hundreds of participants focused on digital content to leverage the industry, create networks, participate in conferences and workshops, and exchange experiences related to the video game industry, including mobile application development, other software development, and three-dimensional computer animation. The event was aimed at professionals and entrepreneurs who are managers and producers of digital content in Colombia.

For the part of video games in Colombia 4.0, those who directly support this great window for the industry are the entrepreneurs who ten years ago consolidated their companies and, today, together with more studios in the sector, are organized into the Colombian Video Games Association (COVA). As of 2019, COVA is made up of the following companies: Efecto Studios, JamCity (formerly Brainz), Teravision Games, Timba Studios, C2 Game Studio, Mad Bricks, Gametron Studios, BW Studios, Below the Game, Atomic Studios, ON3D Studios, and Slashware Interactive. COVA is also linked to FEDESOFT (Colombian Federation of Software Industry and IT, with its acronym in Spanish), a nonprofit organization that is made up of software companies in the country.

In the past decade, other communities have formed in this ecosystem. Thanks to the democratization of development by Unity, the user group of this software has existed in the country since 2014, and there are officially communities in the cities of Bogotá, Medellín, and Cali. Since 2014, a Unity User Expo is held annually in Bogotá, a group meeting in which developers validate their ideas with SOFA (Lounge of the Leisure and the Fantasy, after its syllables in Spanish), which brings together the projects made with Unity from all across the country, providing validation and feedback.

The DVC (Video Game Developers of the Caribbean, with an acronym in Spanish), is a forum in which the academy and the industry converge. With the support of the government, actions are taken that strengthen the industry in the Atlantic region, where seven companies are leading workshops and meeting to share knowledge and tools.

Thanks to these impulses that have been going on for more than fifteen years, the developments of Bogotá, the national capital, have expanded to other regions. There, with the support and political will of the studios, conferences and meetings on video games have been held, such as the Bla Bla Games in Bogotá, the Atlántico Videogame Summit in Barranquilla (both held for the second year in their cities), and the first meeting of the Bucaramanga Game Quest in Bucaramanga. In the second half of 2019, Medellín hosted the first Colombia Videogames Summit (COVS).

Colombia is gaining international notice thanks to two companies that have opened their offices in the country: Unity in Pereira and Jam City in Bogotá, the latter being the developer that stands out for its work on *Harry Potter: Hogwarts Mystery* (2018) and for the acquisition of the Colombian company Brainz, the maker of the indie game *World War Doh* (Beta, 2016).

As of 2019, there are seventy-six video game studios in Colombia: Amazing Soul Game Studio, Ashara Studios, Atomic Studios, Bear House Games, Below the Game, Biinyu Games Studio, Black Mamba, Blazing Soft Blokwise, Blokwise, Blue Crow Studio, Blur Team, Boron Studios, Brash 3D, C2 Estudio, Cocodrilo Dog Games, Comtor, Criforbits, Dead Monkey Entertainment, Dinomotion Studios, Double Fox Games, Double Ring Studios, Dream House Studios, Dreams Uncorporated, Efecto Studios, Eleven Producciones, EzpheraTech, Fogata Morada Colombia, Fryos Studios, GADS Colombia, Gamerascent, Gametron Studios, Glitchy Pixel, Ignicion Games, Indie Level Studio, Inteligencia Futura, Jackalope Joined Your Party, Just Reality Studio, Joycom Games, KillaSoft, Klopper Studio, Kuruk Studios, L-Mental Games, LevelTouch Studios, Level Up Studio, Life2play, Mad Bricks, Mr Alpaca Games, National Games, NEWRONA, Nullbox Media, ON3D Studios, Ocaso Games, Osmentech, Piragna Studios, Poseto Studio, Press Start Co, Rival Arts Studio, R-NEXT, Sandstorm Studio, Shift Active, Slashware Interactive, Studios Nova, SYCK, Somnia Studios, Tamarillo Games, Teravision

Games, the Ethereal Game Factory, Timba Games, Troniks, TyloN Studios, Tyrosoft, Vector3 Game Studio, Wizard Fun Factory, Wulf Games, Wekantu Studios, 4 Pillows Interactive, and 55 Studios. Also Jam City (USA), Undying Games (USA), and Gametopia (Spain) run branch offices in Colombia.

Sandra Castro Pinzón

See also: Argentina; Brazil; Chile; Uruguay

Further Reading

Parra, Luis, and the Global Game Designers Guild (GGDG). "Colombia." In *Video Games around the World*, edited by Mark J. P. Wolf, 137–144. Cambridge, MA: MIT Press, 2015.

Comics

Much like other media forms, such as television and feature films, a significant number of video games have been adapted from comic books and comic strips. Several of the earliest video game adaptations from comics include the Atari VCS 2600 games *Superman* (1979) and *Spider-Man* (1982). Adaptations from comic strips for the Atari 2600 are also to be found, including *Snoopy and the Red Baron* (1983), based on the *Peanuts* character, and *Flash Gordon* (1983), which was released after the 1980 film of the same name. Comic strip–inspired *Popeye* (1983) also followed a motion picture adaptation and was released on the Atari 2600, the Mattel Intellivision, the ColecoVision, and several other platforms.

Adaptations from European comics include *Obelix* (1983), based on the character from the French *Asterix* comics, and *Smurf: Escape from Gargamel's Castle* (1982) for the ColecoVision and the Atari 2600 as well as the educational game *Smurfs Save the Day* (1983) for the Atari 2600 were inspired by Belgian comics. In the United States, Marvel Comics characters Spider-Man and the X-Men and DC Comics characters Batman and Superman have been among the comic book properties to be adapted most frequently to video games. In Japan, video game adaptations of manga (Japanese comic books) characters are perhaps even more common, including games based on popular series such as Takao Saito's *Golgo 13* and Akira Toiyama's *Dragon Ball*. The continued global popularity of comic adaptation games is evinced by titles such as *Marvel's Spider-Man* (2018), which was one of the most successful games released for Sony's PlayStation 4, and the multiplatform *Batman: Arkham* (2009–19) series, the first game of which was added to the *Guinness Book of World Records* in 2009 as "Most Critically Acclaimed Game Ever."

Comic book adaptations of video games can also be found but are far less prevalent than games based on comic books. These comic book adaptations often function as paratextual and world-building enhancements for the particular video games upon which they are based. For example, Blizzard Entertainment's multiplayer game *Overwatch* (2016) utilizes a comics series among other transmedia components outside of the game to provide backgrounds for different characters and to build the narrative universe of the game world.

In 1982, DC Comics created several mini comic books, including the series *Atari Force*, for inclusion with the packaging for games for the Atari 2600. The stories of these DC mini comic books were focused on the particular games with which they were included, such as *Defender* (Atari 2600 version, 1981) and *Galaxian* (Atari 2600 version, 1983), and DC also produced a stand-alone version of the *Atari Force* comic from 1982 to 1986. Japanese publisher JICC created several manga books based on Origin's *Ultima* series of role-playing games (RPGs), starting with *The Terror of Exodus* (1988) adapted from the *Ultima III: Exodus* (1983) when the game was ported to the Nintendo Entertainment System (NES). Valiant Comics published a series of comics under the *Nintendo Comics System* name from 1990 to 1991, including titles based on the *Mario* series and *The Legend of Zelda* series. Archie Comics began publishing *Sonic the Hedgehog* in 1993, which remains in publication, and Top Cow published *Tomb Raider* from 1997 until 2005. Perhaps the most successful case of adaptation to comic books and other media is Nintendo's *Pokémon* series, which was first released as a pair of video games for the Nintendo Game Boy in 1996 and has been successfully adapted to a number of media forms, including manga, anime (Japanese animation), feature films, and toys.

Several video games adopt comic book–like aesthetics or gameplay mechanics, including Distinctive Software's *Accolade's Comics* (1987) and SEGA's *Comix Zone* (1996), both of which employ comic book panels, and Capcom's *Viewtiful Joe* (2003), which was also adapted to an anime series in Japan. Ubisoft's *XIII* (2003), adapted from the Belgian comic book series of the same name, and Blue Manchu's *Void Bastards* (2019) are first-person shooting games that use a cel-shaded graphical style, comic book panels, and speech and sound effect bubbles. Other games, such as the *Max Payne* series (2002–12), employ comic book aesthetics for the purposes of establishing a game's backstory and advancing the narrative between game levels.

Christopher Hanson

See also: Adaptation

Further Reading

Crescente, Brian. "Why Video Games Can Make for Great Comics (and Vice Versa)." Polygon, October 21, 2013. Available at https://www.polygon.com/2013/10/21/4862246/why-video-games-can-make-for-great-comics-and-vice-versa.

Ecenbarger, Charlie. "Comic Books, Video Games, and Transmedia Storytelling: A Case Study of the Walking Dead." *International Journal of Gaming and Computer-Mediated Simulations* (*IJGCMS*) 8, no. 2 (April 1, 2016): 34–42. Available at https://doi.org/10.4018/IJGCMS.2016040103.

Rauscher, Andreas, Daniel Stein, and Jan-Noël Thon, eds. *Comics/Games: From Hybrid Medialities to Transmedia Expansions*. New York: Routledge, forthcoming.

Computer Games

The term *computer games* is sometimes used synonymously with *video games*, but not all early video games used a microprocessor, which is usually implied by the term *computer*. Likewise, not all games using a computer are video games because some of them do not involve video or graphics; for example, the board game *Stop Thief* (1979) has a handheld computer that makes sounds that relate to gameplay on the board; therefore, the game could be considered a computer game but not a video game. Often, *computer games* is used to refer more specifically to home computer games, which differ from arcade games and home console–based games in that they are designed to be played on a computer, which was typically not designed with gameplaying in mind, as opposed to video games for dedicated systems.

A man playing *FIFA 19* on a gaming laptop. (Aiman Khair/Dreamstime.com)

EARLY DEVELOPMENT

The earliest computer games were mainframe games that were written and played during the 1960s on the large mainframe computers found at universities and large corporations. As home computers began appearing in the 1970s, games were created for them as well. Home computer games differed from arcade games in several ways. Whereas arcade games tried to bring in more income by typically being fast-paced and ending quickly (unless the player had enough skill to prolong the game), home computer games were purchased by the player and could be more leisurely and contemplative in nature. Games taking many hours to play that were not financially feasible in the arcade were welcome as home computer games, and certain game genres, including text-based games, adventure games, puzzle games, role-playing games (RPGs), simulation games, and adaptations of games like chess and checkers, mainly appeared on home computers, where players could spend hours playing them.

Although early home computers did not have the computing power found in arcade games, home computer games also differed from early home console–based games in that they could record data and allow games to be paused and saved. Computer disks contained more memory than the typical cartridges of the early era, allowing games to be larger and more complex. Home computer games also served to provide motivation for the sales of many early home computers, offering a way for people to play video games at home, and many even allowed players to experiment with writing their own games, which encouraged the start up of more home computer game companies.

GROWING COMPETITION

During the 1980s, home computer systems and their games improved as technology advanced, and home computer games, along with home console games, became the main competition for arcade games, which had to stay a step ahead of home games' capabilities if they were to survive. Arcade machines and home video game consoles were both dedicated systems designed for the playing of video games, which gave them an advantage over home computers that were multipurpose machines. As home computers developed, however, they would acquire various technologies for purposes other than video games, which would later be put to use for video games and allow games to do things they could not do on dedicated machines of the time.

First, modems provided connectivity through phone lines that allowed home computers to dial up to bulletin board systems (BBSs) and multiuser domains (MUDs) as well as early networked games and online games for multiple players, such as *Scepter of Goth* (1983). Although home consoles were quick to follow up with the appearance of Mattel's PlayCable Service in 1981 and the CVC Gameline Master Module in 1983 (a cartridge for the Atari VCS 2600 that allowed games to be downloaded into it from a modem), home consoles with online connectivity would not be the norm for sometime. Home computers would also be the main source of access for the playing of massively multiplayer online role-playing games (MMORPGs) in the latter half of the 1990s and into the 2000s, and home console systems would again take a while to catch up, with the SEGA Dreamcast, released in 1998 in Japan and 1999 in North America, being the first home console system to include a built-in modem through which MMORPGs could be played.

Home computers also continued to lead the way in storage media, incorporating CD-ROM drives and supporting the first CD-ROM games, such as Cyan's *The Manhole* (1987), often cited as the first game to appear on CD-ROM. Home console systems caught up a year later, with the NEC PC-Engine/ Turbografx-16's CD-ROM peripheral appearing in 1988, and over the next decade, the CD-ROM would replace cartridges as the standard storage medium used by console systems. Likewise, popular games such as *Myst* (1993) would encourage the purchase of CD-ROM drives for home computers.

CONVERGING TECHNOLOGIES

As arcade games declined during the 1990s, home console games and home computer games became the main competitors in the computer game industry; home consoles would continue to take on functions of home computers, and games would be released on both home computer and home console platforms. By the beginning of the 2000s, commercial computer technology was keeping pace with home console video game technology, with the latter staying only a step ahead due to its design as a dedicated system, although many console systems could also play CDs and DVDs and go online while sharing a number of other functions with personal computers.

At present, then, little distinction remains between computer games and other types of video games because they now all use computers in some form; the only question is whether a computer system was designed with gaming as its main purpose and marketed as a video game system. With video games available on almost every kind of personal computing device, one could argue that the term *computer games* has finally come to encompass all contemporary video games.

In game scholarship, the term *computer games* is used more often in Europe, probably because most Europeans first encountered video games on home computers or home console systems as opposed to in arcades, where many in North America first encountered them. In North America, such games were referred to as *video arcade games* to distinguish them from other kinds of arcade games, which was later shortened to *video games* to be inclusive of home games. The term has remained the main one in use since then.

Mark J. P. Wolf

See also: Animation (Computer); Mainframe Games

Further Reading

Bell, A. G. *Games Playing with Computers*. London: George Allen & Unwin Ltd., 1972.

Crawford, Chris. “The History of Computer Games: The Atari Years.” *Journal of Computer Game Design* 5. Available at http://www.erasmatazz.com/TheLibrary/JCGD/JCGDV5/AtariYears/AtariYears.html (site discontinued).

Eimbinder, Jerry, and Eric Eimbinder. “Electronic Games: Space-Age Leisure Activity.” *Popular Electronics*, multipart essay appearing over several months 14 no. 4 (October 1980).

Haddon, Leslie. “Electronic and Computer Games, the History of an Interactive Medium.” *Screen* 29, no. 2 (1988): 52.

Raessens, Joost, and Jeffrey Goldstein, eds. *Handbook of Computer Game Studies*. Cambridge, MA: MIT Press, 2005.

Spencer, Donald D. *Game Playing with Computers*. New York: Spartan Books, 1968.

Computer Games Magazine

Computer Games Magazine, published in print from 1988 until 2007, was a monthly periodical dedicated to both reviewing games available on personal computers and providing industry news related to their production. In addition to game criticism and industrial reporting, *Computer Games Magazine* also had interviews with game designers, featured articles written by those active within game development communities, and published reports from games conferences and trade shows. *Computer Games Magazine*'s long-standing focus specifically on personal computer games differentiates the publication from periodicals that discuss video games available for dedicated console systems as well as personal computers. As *Computer Games Magazine*'s original editor in chief, Brian Walker noted in a press release issued in 1991 that 90 percent of the periodical's focus at the time was on MS-DOS games, and the other 10 percent of reporting focused on games for such platforms as the Commodore Amiga and the Atari ST.

In print for nineteen years, *Computer Games Magazine* is one of the longest-running magazines dedicated to personal computer games following *Computer Gaming World*, which was published from 1981 to 2006, and *PC Gamer*, which began publishing in 1993. *Computer Games Magazine* was originally published as *Games International* in Great Britain. The name reflects the magazine's international scope; for example, the second issue features Walker reporting on the Essen Games Fair held in Germany on October 27–30, 1988, in addition to reports focusing on British games and gaming events. Before Walker's sale of the magazine's publishing rights in 1991, the editor in chief changed the name to *Strategy Plus*, denoting the magazine's increasingly specific focus on strategy games. At this time, the magazine's layout was divided into large sections dedicated to broad generic categories, progressing from strategy games to adventure games to sports games and finally to simulation games.

In 1991, Yale and Tina Brozen acquired the magazine from Walker. Owners and operators of a mom-and-pop computer retailer and online software distributor named Chips & Bits, located in Vermont, the Brozens continued to distribute the publication to 240,000 subscribers worldwide after renaming the magazine *Computer Games: Strategy Plus*. Acquiring Chips & Bits in 1999, Florida-based publisher TheGlobe.com again retitled the periodical as *Computer Games Magazine*, the fourth and final iteration of the print publication. Reflecting the magazine's corporate ownership, later issues focused not only on multiple game genres but also on games available for dedicated gaming consoles, moving the magazine's focus away from the rigid definition of computer games as only those games available on personal computers.

In March 2006, Jayson Dubin, *Computer Games Magazine*'s president, announced the forthcoming publication of *Massive Magazine*, an offshoot publication specifically dedicated to massively multiplayer online role-playing games (MMORPGs), with the first issue to be published on September 19, 2006. Citing both the increasing popularity of such games as *World of Warcraft* (2004) and the dedication of MMORPG players to the virtual worlds they inhabit, Dubin perceived a growing demand for a publication dedicated to MMORPGs. While both *Computer Games Magazine* and *Massive* released print issues in 2006 and early 2007, a California state lawsuit filed against publisher TheGlobe.com concerning spam messages distributed to MySpace subscribers led to the cancellation of both magazines' print publications, as TheGlobe.com's finances were depleted. An attempt to transition into an online distribution model and establish a comprehensive archive of *Computer Games Magazine* past issues through the website www.cgonline.com is still in progress.

Harrison Gish

See also: *Computer Gaming World*; *Game Informer*; *Play Meter* Magazine; *RePlay* Magazine

Further Reading

Computer Games Magazine, 1988–2007. Older content available at https://web.archive.org/web/20050402030812/ http://www.cdmag.com/articles/ (site discontined).

Computer Gaming World

Computer Gaming World, published from 1981 until 2006, is one of the longest-running publications specifically dedicated to games playable on personal computers. Featuring numerous reviews, interviews, and essays penned by game designers, conference and festival reportage, technology reviews, and game awards, *Computer Gaming World* distinguished itself from its contemporaries through its aesthetics, its multifaceted reviews, and its editorial emphasis on how games relate to issues such as literary genre, historical representation, and technological and industrial development. Distributed to over three hundred thousand subscribers at the height of its popularity, *Computer Gaming World* garnered the respect and praise of mainstream news media, with the *New York Times* referring to the publication as "the bible of computer game purists" in 1999 and "one of the top computer game magazines" in 2005 (Schiesel 2005).

In print for twenty-five years, *Computer Gaming World* reflects major changes in video games, game culture, and game journalism. In the early 1980s, *Computer Gaming World* was published six times a year and averaged approximately forty to fifty predominantly black-and-white pages an issue. The first issue, covering November and December of 1981, anticipates the magazine's continuing focus on nuanced criticism. For example, Bob Proctor's review of *Torpedo Fire* (1981), an Apple II submarine game, in the first issue has separate sections specifically dedicated to the gameplay system, the game's graphics, the game's feel, the differentiated modes of play, and play strategy, and it also includes a sidebar defining and discussing simulations and wargames alongside interpretive artwork by Tim Finkas, who designed the covers of *Computer Gaming World* from 1981 to 1985. Foregrounding home computing's potential for digital games, Finkas's cover for the first issue depicts a dragon emerging from a personal computer, and later covers would represent subjects as diverse as *2001: A Space Odyssey* (1968), Grant Wood's *American Gothic* (1930), and Napoleon Bonaparte, while slyly referencing computing technology and game design, done in the art style of early 1980s fantasy and science fiction. The inaugural issue also features an opening essay by Chris Crawford entitled "The Future of Wargaming," in which Crawford discusses the relationship of wargames as a genre to the increasing ubiquity of the personal computer, technological advancement, and software development.

Throughout *Computer Gaming World*'s early years, such journalistic variety was paramount: the October–November 1982 issue opens with both short fiction and an essay on piracy; the March 1988 issue's cover story solicits the opinions of Isaac Asimov, Douglas Adams, and Harlan Ellison, among other noted science fiction authors, on computer games and the potential of digital technology for the genre; the July 1988 issue contains an interview with Tom Clancy and Sid Meier on strategy simulations and an essay by Richard Garriott discussing the design of the *Ultima* franchise; and the December 1988 issue features an interview with Roberta Williams alongside the review of her game *King's Quest IV: The Perils of Rosella* (1988).

Computer Gaming World's scope increased along with its readership and the growth of the gaming industry. In 1988, the magazine began publishing monthly, and by 1991, it had reached approximately one hundred pages in length per issue (the one hundredth issue, released in December 1991, was almost two hundred pages, and the December 1997 issue was in excess of five hundred). Originally published independently and edited by Russell Sipe, contributor Johnny Wilson became editor in 1992 (his successors as editor in chief, George Jones and later Jeff Green, had also worked at *Computer Gaming World* before taking the helm). In 1993, *Computer Gaming World* was sold to Ziff Davis, LLC, a corporate publishing company. In 2006, Ziff Davis announced that *Computer Gaming Monthly*, in partnership with Microsoft, would become *Games for Windows: The Official Magazine*; in 2008, this new iteration of *Computer Gaming World* ceased publication, reflecting the difficulties faced by computer game print publications in the burgeoning era of online game journalism.

While the later issues of *Computer Gaming World* differ in size, scope, and aesthetics from the smaller magazine published by Sipe in the early 1980s, its continuing focus on in-depth reviews and nuanced criticism of game culture remained; the final issue, from November 2006, features a special report on Chinese game development and correspondence from readers both decrying and celebrating two controversial pieces, one on Middle East game design and the other on progressive in-game protests within violent games, which were published in the September 2006 issue. Today, the entirety of the magazine's run is available free as high-quality PDFs on the Computer Gaming World Museum website (http://www.cgwmuseum.org), which also includes a brief history of the magazine and a detailed interview with Finkas.

Harrison Gish

See also: *Computer Games Magazine*; *Game Informer*; *Play Meter* Magazine; *RePlay* Magazine

Further Reading

Computer Gaming World Museum website. Accessed September 6, 2020. Available at http://www.cgwmuseum.org.

Schiesel, Seth. “Conqueror in a War of Virtual Worlds.” *The New York Times*, September 6, 2005, Section E, Page 1.

Computer Space

Computer Space was the world’s first commercially sold video game and, as such, marks the beginning of the video game industry. Although video games had been created in the lab and university settings before, and the coin-operated mini-computer driven *Galaxy Game* (1971) on the Stanford University campus may have preceded it, and by up to two months, *Computer Space* was the first widely available stand-alone release.

Created by Nolan Bushnell and Ted Dabney, *Computer Space* used no CPU, RAM, or ROM and instead was based on 74-series transistor–transistor logic (TTL) and a low-cost General Electric black-and-white television set. Bushnell brought the idea to Nutting Associates, a Mountain View, California, arcade game manufacturer, for production, and it was released in November 1971. *Computer Space* was inspired by the game *Spacewar!* (1962) developed by Steve Russell, J. Martin Graetz, and Wayne Witaenem on a DEC PDP-1 computer at the Massachusetts Institute of Technology (MIT). Before its release, Nutting Associates even referred to the project internally as the “SW” or “*Spacewar!*” project.

In *Computer Space*, a player controls a rocket ship using buttons for thrust, rotation, and weapons fire. Enemy flying saucers shoot at the player, and the player shoots back. Each hit scores one point. Upon reaching fifteen points, the next hit returns the score back to zero. Points are displayed via one on-screen character, the numbers zero through nine, and custom characters for ten through fifteen. A game lasts ninety-nine seconds, although at the end of the time period, if a player’s score exceeds the enemy’s score, the player receives another ninety-nine seconds. This bonus feature can be repeated indefinitely. A two-player version of the game was released in which joysticks were added to the control panel.

The games were placed in custom-designed curved fiberglass cabinets to attract attention. Initially, a single-player version was released and was available in red, blue, and yellow. Additionally, one white unit was made for exhibition. A two-player version was later released in green cabinets. Only 1,500 single-player models and as few as 350 green two-player units were produced. At least 100–150 of the single-player models and 30–50 of the two-player models have survived. The Museum of the Game holds the three earliest produced surviving units, including the only white one made by the factory.

Computer Space was not a commercial success, likely due to its unfamiliar theme and learning curve. Nolan Bushnell is reported to have said after the fact, “It was a little too complicated for the guy with the beer in the bar.” Still, it attracted some attention, and at least one company produced a clone of it (For-Play’s *Star Trek* [1972]). *Computer Space* appeared prominently in the film *Soylent Green* (1973) and in an arcade scene in the film *Jaws* (1975).

Bushnell believed in both his own ability and in the commercial viability of coin-operated video games. To develop another release for Nutting, he wanted an equity interest in the company. Bill Nutting turned him down, and Bushnell and Ted Dabney left to form a new company, Atari. Atari's first release was the coin-operated game *PONG* (1972), which in turn was inspired by (and attracted lawyers representing) the tennis game from Ralph Baer's Magnavox Odyssey. Atari's *PONG* was very successful, causing the general public to often incorrectly identify it as the first arcade video game release.

Computer Space can be seen at Penny Arcadia exhibitions of the Museum of the Game in Los Angeles, California; at museums from the Computer History Museum in Mountain View, California, to the Strong Museum of Play in Rochester, New York; at arcade shows, including California Extreme (a classic coin-op arcade convention held each summer in Santa Clara, California); and in the homes of dozens of classic video game collectors throughout the world.

Greg McLemore

See also: *Spacewar!*

Further Reading

"Computer Space" web page at the Museum of the Game website. Available at http://www.arcade-museum.com/C/Computer_Space.html.

Edwards, Benj. "Computer Space and the Dawn of the Arcade Video Game: How a Little-Known 1971 Machine Launched an Industry." Technologizer, December 11, 2011. Available at https://www.technologizer.com/2011/12/11/computer-space-and-the-dawn-of-the-arcade-video-game/.

Console-Based Games

As opposed to arcade games, personal computer games, or mobile games, console-based gaming requires the use of a dedicated device that displays its output through an external monitor, typically a television screen. The first video gaming console was the Magnavox Odyssey, originally conceived by inventor Ralph Baer as a prototype, then known as the Brown Box, in 1968 before its commercial release in 1972. An analog device with games that were hardwired into the console itself, the Odyssey also lacked sound output and only displayed black-and-white graphics, although Magnavox packaged the console with a number of vivid plastic covers that could be placed over the screen to emulate the effect of color. Although the arcade scene would remain at the forefront of the gaming industry for some years, Magnavox had succeeded in popularizing the idea of a device that allowed games to be played on a television set at home.

The Odyssey was the first of a generation of dedicated consoles, most of which played variations of ball-and-paddle games similar to Atari's pioneering arcade classic *PONG* (1972), which was also made available for the home market as *Home PONG* (1975) under Sears's Tele-Games brand. The proliferation of *PONG*-like home game consoles was made possible by General Instruments' AY-3-8500 chip, which contained all the elements needed for a game on a single chip. The flood of consoles resulting from the chip's popularity led to the crash of 1977 and the end of the first generation of console technology.

FROM DEDICATED SYSTEMS TO CARTRIDGE-BASED SYSTEMS

In 1976, Fairchild Semiconductor's Fairchild Channel F introduced the video game cartridge to the public and with it the concept of interchangeable games that would become a hallmark of future consoles. Although only a small number of titles were released for the Channel F, mostly developed by Fairchild itself, the device was more successful than RCA's Studio II, a device already obsolete by the time of its launch in early 1977. A hybrid device of sorts, the Studio II played cartridge-based games along with a number of games built into the console itself. Like Magnavox's console, the Studio II only output black-and-white video and was guaranteed an early demise by the release of Atari's technologically superior Atari VCS, later renamed the 2600, in 1977.

The 2600 expanded on Atari's earlier efforts to market *Home PONG* and introduced the plug-in cartridge format to a mass audience. For the first time, a home console could reproduce a reasonable facsimile of a gamer's favorite arcade titles—their graphical superiority compared to home consoles provided much of the appeal of the arcade scene—and the success of the device was buoyed by the release of home ports of other popular arcade titles, such as Atari's *Tank!* (1973) and *Missile Command* (1980). Alongside the arcade ports were many original games, such as Activision's *Pitfall* (1982) and Atari's *Adventure* (1979), the first graphical adventure game. One of the most popular cartridges, which boosted overall sales of the system, was the 1980 port of Taito's *Space Invaders* (1978), the first licensed home video game release. However, licensing well-known games proved to be a double-edged sword when Atari's home version of Namco's wildly popular *Pac-Man* (1980; released on the 2600 in 1982) was widely criticized for bearing little resemblance to the arcade original. The cartridge, along with Atari's *E.T.: The Extra-Terrestrial*—rushed to release in 1982 to capitalize on the popularity of the film of the same name—was returned to stores in vast quantities by disappointed buyers. These releases were typical of a glut of low-quality, and often third-party, games that weakened interest in video games and contributed to the industry-wide crash of 1983.

Intervening years had seen the release of the Magnavox Odyssey^2 (1978), the Mattel Intellivision (1979), and Coleco's ColecoVision (1982), devices that enjoyed modest success before the crash dealt a devastating blow to consumer confidence in the fledgling console industry. The Odyssey^2 proved popular in the European market, but its success in North America was limited by its inferior graphical capability compared with the 2600 and its lack of third-party software support. The Intellivision, on the other hand, was technically superior to the 2600 but was undermined in the marketplace by Mattel's failure to deliver the Keyboard Component—a highly touted peripheral that would convert the Intellivision into a functional home computer—into the hands of consumers, a controversy that prompted the Federal Trade Commission to investigate Mattel for false advertising and fraud. Lastly, the ColecoVision boasted an impressive library of games (especially following the release of a peripheral that took advantage of a legal loophole and allowed the console to play games for the 2600) and superior technical specifications but faced an uphill struggle when it launched shortly before the 2600's software glut crashed the North American console industry. However, all of these consoles fared better than RDI Video Systems' Halcyon (1984), a laserdisc-based console that saw the release of just two games before bankrupting its parent company. Not even the release of Atari's update to the 2600, the Atari 5200, in 1982 could prevent a recession that only Atari managed to weather.

AN INDUSTRY REVIVED

The fortunes of the video game console in North America would not begin to recover until the 1985 release of the Nintendo Entertainment System (NES), which had been released in Japan in 1983 as the Nintendo Famicom. Although ports of Nintendo's arcade hit *Donkey Kong* (1981) had proven popular on the 2600, Intellivision, and ColecoVision in 1982, Nintendo's decision to enter the console business was viewed with skepticism in an American market still reeling from the crash of 1983. Nintendo, however, had an ace up its sleeve: designer Shigeru Miyamoto, who followed the arcade success of *Donkey Kong* and *Mario Bros.* (1983) with *Super Mario Bros.* (1985). This progression saw the games' mustachioed hero scaling a construction site to save his girlfriend from a rampaging ape, clearing a sewer of vermin, and, finally, traversing the Mushroom Kingdom to rescue its princess from a fire-breathing turtle named Bowser. *Super Mario Bros.* proved immensely popular and inspired innumerable other action-platform titles for the NES, among them Konami's *Castlevania* (1986) and Capcom's *Mega Man* (1987), both of which would in turn spawn myriad sequels on the NES and subsequent consoles.

The action-platform game would come to be the dominant genre on gaming consoles over the course of the next decade, taking advantage of the speed of dedicated gaming consoles in comparison to contemporary home computers, where slower-paced adventure games prevailed. The NES also saw its own share of cerebral gaming in Miyamoto's *The Legend of Zelda* (1986)—the first cartridge to feature a built-in battery that allowed game progress to be saved even after the NES was turned off—in which protagonist Link embarked on an epic fantasy quest that introduced many players to the concept of an expansive, consistent game world ripe for exploration. In addition to Miyamoto's games, Nintendo released beloved action titles such as *Kid Icarus* (1987) and *Metroid* (1986) for the NES, the latter of which introduced gaming's first notable female protagonist, bounty hunter Samus Aran, and helped establish a stable of beloved characters that Nintendo would continue to draw on throughout the life spans of subsequent consoles.

Although the massive success of the NES single-handedly reignited Western interest in video games, it also allowed Nintendo to ink exclusivity deals with numerous third-party developers, severely limiting the libraries of competing consoles such as the SEGA Master System (released in Japan in 1985 as the SEGA Mark III) and the Atari 7800 Prosystem, both released in 1986. Although the 7800 gained some measure of popularity thanks to its backward compatibility with almost all 2600 games and a selection of popular arcade conversions that included Atari's own *Centipede* (1980; released on the 7800 in 1987), Namco's *Ms. Pac-Man* (1981; released on the 7800 in 1987), and Bally/Midway's *Rampage* (1986; released on the 7800 in 1988), SEGA would have to wait until the next generation of machines before it established itself as a major player in the console market in North America, although the Master System proved popular internationally. That generation arguably began in 1987 with the Japanese launch of the NEC PC-Engine TurboGrafx-16 (a North American release would follow in 1989), which boasted 16-bit video processors that represented a marked improvement over the graphical capabilities of the 8-bit processors utilized by the NES and its competitors. The core CPU of the TurboGrafx-16, however, was still 8-bit, making the console something of a stepping-stone between the 8-bit and 16-bit generations of consoles.

It was SEGA who took the next step into the 16-bit era with the SEGA Mega Drive, released in Japan in 1988 and in North America in 1989 under the name SEGA Genesis. Early in this new console's life, SEGA released several fighting games, notably *Altered Beast* (1988) and *Golden Axe* (1989), before demonstrating the processing speed of its machine by debuting a new mascot in 1991's *Sonic the Hedgehog,* whose titular protagonist traversed a series of platform levels with blinding speed and a determined smirk that set him apart from Nintendo's wide-eyed Mario. The game was followed by *Sonic the Hedgehog 2* in 1992 and twin sequels *Sonic the Hedgehog 3* and *Sonic and Knuckles* in 1994, a period during which SEGA also released another popular action title, *Ecco the Dolphin* (1992).

In 1990, Nintendo followed the success of the NES with the Japanese release of its successor, the Super Famicom (released a year later as the Super Nintendo Entertainment System (SNES) in North America), a 16-bit console that could compete on an even footing with the TurboGrafx-16 and the Genesis. Building on the formula of its first console, Nintendo ensured that the SNES's launch was accompanied by a Mario title, *Super Mario World* (1990), along with *F-Zero* (1990), a high-speed futuristic racing game that exhibited the console's ability to simulate three-dimensional graphics. Using a technique known as Mode 7 rendering, the console used two-dimensional graphics to create the illusion of three-dimensional movement; this was years in advance of the true polygonal three-dimensional rendering that would be ushered in by the next console generation. This technique would be used in many of the SNES's most beloved titles—among them *The Legend of Zelda: A Link to the Past* (1991) and *Super Mario Kart* (1992)—and would also surface in many of Square's popular role-playing games (RPGs) for the console, including *Final Fantasy VI* (1994), *Chrono Trigger* (1995), and *Super Mario RPG: Legend of the Seven Stars* (1996), a collaboration with Nintendo late in the console's life. Other popular releases for the SNES era included *Super Metroid* (1994), released the same year as the first entry in Rare's popular *Donkey Kong Country* series, which granted Mario's original foe a platform title of his own.

In addition to Mario-style platform games and RPGs, fighting games proved extremely popular on both the SNES and the Genesis, most notably Capcom's smash arcade hit *Street Fighter II* (1991). The first of several home versions of the game, *Street Fighter II: The World Warrior* was released in 1992. *Street Fighter* and its ilk were also dominating the arcade scene at the time, inspiring intense competition among players that drove sales of fighting games on home consoles. The release of another popular arcade conversion, Midway's *Mortal Kombat* (1992; released on the SNES in 1993), drew attention to Nintendo's family-friendly approach to the video game business. The plentiful blood of the notoriously violent original was changed to sweat in the sanitized SNES port, which, unlike the Genesis version of the game, featured no code to unlock the full gore of the arcade version. Poor sales of *Mortal Kombat* on the SNES caused Nintendo to redact this approach with the release of *Mortal Kombat II* (1993) on the console in 1995.

THE RISE OF THREE-DIMENSIONAL GRAPHICS

Like the transition from 8-bit to 16-bit consoles, the leap to a new generation of devices capable of displaying polygonal three-dimensional graphics left a number of casualties in its wake. Atari attempted to reestablish itself as a console manufacturer with the 1993 release of the Atari Jaguar, but it—much like Panasonic's 3DO Interactive Multiplayer, released the same year—was doomed by a lack of third-party developer support. SEGA's 1994 successor to the Genesis, the SEGA Saturn, was undone instead by the arrival of a new player in the console market that year, the Sony PlayStation, which like the Saturn took advantage of the high data capacity and inexpensive manufacturing process afforded by the CD-ROM format. Although the Saturn boasted some beloved titles, including SEGA's own *Nights into Dreams* (1996) and *Panzer Dragoon Saga* (1998), unfavorable comparisons to the PlayStation as well as Sony's decision to undercut the Saturn's retail price ensured that the console never found a solid footing in the marketplace.

The PlayStation, which entered the American marketplace in 1995, revolutionized the general public's perception of video gaming. Unlike the dominant Nintendo and SEGA consoles of the late 1980s and early 1990s, the PlayStation lacked a child-friendly mascot, though the titular character of Naughty Dog's *Crash Bandicoot* (1996) was seen to fulfill that role in an unofficial capacity until 2000, when Sony's role as the series' publisher came to an end. Rather, games like Sony Computer Entertainment's futuristic racing game *wipEout* (1995), UEP Systems' *Cool Boarders* (1996), and Activision's *Tony Hawk's Pro Skater* (1999) ensured the console's association with the nascent rave and extreme sports subcultures prominent in the young adult demographic that would come to dominate video gaming for the next decade. Car culture was also well represented by Namco's arcade port *Ridge Racer* (1995) and Sony's own *Gran Turismo* (1997), developed by Kazumori Yamauchi's Polyphony Digital, which was by far the most comprehensive driving simulation available on a console.

During the same period, ambitiously cinematic titles such as Square's role-playing epic *Final Fantasy VII* (1997) and Konami and director Hideo Kojima's "Tactical Espionage Action" game *Metal Gear Solid* (1998) took advantage of the storage capacity of CD-ROMs via full-motion video (FMV) sequences that incorporated cinematic storytelling conventions, resulting in a more immersive narrative experience than had previously been possible on consoles. Konami also released an RPG-influenced update to its venerable *Castlevania* series in *Symphony* *of the Night* (1997) and survival horror game *Silent Hill* (1999) that, along with Capcom's *Resident Evil* (1996), popularized the horror genre among console gamers. Meanwhile, Namco's *Tekken* (1994; released on the PlayStation in 1995) established a major new three-dimensional fighting franchise, and Sony's DualShock, a 1998 update to the original PlayStation controller that added vibration feedback and twin analog sticks, became an iconic piece of hardware, the design of which endured as a consistent part of the PlayStation line.

The analog stick was a design element borrowed from the PlayStation's most notable competitor, the Nintendo 64, an idiosyncratic console released in 1996. Unlike Sony and SEGA, Nintendo chose to ignore the onset of the CD-ROM format, instead making the controversial decision to continue releasing games on expensive plastic cartridges. More popular with children than with the young adult market courted by Sony, early titles such as *Super Mario 64* (1996) and *Mario Kart 64* (1996) played to the strengths of the cartridge format by featuring cartoon-inspired graphics that emphasized bright colors and limited texturing. The former also established the template for the three-dimensional platform game in much the same ways that *Super Mario Bros.* had for the two-dimensional platform game a decade earlier.

Nintendo's long-standing relationship with Rare yielded similar character-based action titles such as *Banjo Kazooie* (1998) and *Donkey Kong 64* (1999) as well as titles aimed at an older audience. Most notable among these were *Goldeneye 007* (1997) and its spiritual successor *Perfect Dark* (2000), games that made first-person shooting games a viable proposition on consoles when the genre had previously been associated primarily with home computers. Mouse-and-keyboard controls allowed for greater aiming precision, and computers' online capabilities allowed for a multiplayer experience that would not exist on consoles for several years, though the Nintendo 64's four built-in controller ports allowed for shootouts between up to four players to take place on a single screen. Also taking advantage of the console's multiplayer capabilities was HAL Laboratory's *Super Smash Bros.* (1999), a title that exploited Nintendo's extensive stable of iconic characters, from Mario to Link to Samus to Donkey Kong, by pitting them against each other in fevered free-for-all battles. Link himself received two adventures on the console—*Ocarina of Time* (1998) and *Majora's Mask* (2000)—the former an acclaimed three-dimensional reimagining of the hero's eternal battle against his nemesis Ganondorf and the latter the first in a number of stylistic deviations for the series in which players experienced a perpetual three-day cycle that could only be broken by solving the game's myriad challenges.

It was into this race between Sony and Nintendo that SEGA attempted to reestablish itself with the 1998 release of the SEGA Dreamcast. Despite being the first console to feature a modem and boasting beloved launch titles such as *Sonic Adventure* (1998) and Namco's *Soulcalibur* (1998; released on the Dreamcast in 1999), the Dreamcast struggled to find a wide audience, and SEGA announced the end of support for the console a little over a year after its 1999 North American launch. However, the device drew praise from hardcore gamers for its rich library of fighting games, notably the *Soulcalibur* series along with a host of Capcom efforts, including *Power Stone* (1999) and *Marvel v. Capcom 2* (2000). During this period, the technical capabilities of consoles caught up to those of arcade machines, and enhanced ports of arcade titles contributed to the death of the arcade scene in North America. Meanwhile, SEGA's own highly anticipated adventure title *Shenmue* (2000) divided critics and—despite the release of *Shenmue II* (2001)—creator Yu Suzuki's planned trilogy has remained unresolved.

NEW CHALLENGES AND GENERATIONS

The early demise of the Dreamcast is often attributed to the high level of consumer anticipation for the 2000 release of the Sony PlayStation 2. Utilizing the DVD format, the PlayStation 2 built on the successes of Sony's first console by quickly amassing a library of prominent games, including Konami's *Metal Gear Solid 2: Sons of Liberty* (2001) and Square's *Final Fantasy X* (2001). The console also saw the release of influential titles, including Capcom's *Devil May Cry* (2001), a new breed of action game that encouraged players to not only keep protagonist Dante alive but to dispatch his foes in increasingly stylish and creative ways, and Rockstar Games' *Grand Theft Auto III* (2001), whose open-ended structure and lurid underworld narrative proved extremely popular among gamers while igniting a firestorm of controversy in the mainstream media. Namco released a cult favorite in Keita Takahashi's *Katamari Damacy* (2004), a game with a charmingly offbeat aesthetic that tasked players with rolling environmental objects into ever-larger balls of debris, while Activision caused a mainstream sensation with *Guitar Hero* (2005), which included a guitar-shaped peripheral that simulated the sensation of playing a real instrument.

First-party Sony titles *Ico* (2001) and *Shadow of the Colossus* (2004), both developed by Fumito Ueda's Team Ico, broke new ground by exploring the emotional relationship of the player to the game world with a more deft touch than had previously been employed, and Sony Interactive Entertainment Santa Monica brought the action genre to new heights of epic melodrama with *God of War* (2005), a blood-soaked reimagining of Greek mythology. Sony also followed SEGA's lead into the online arena with developer Zipper Interactive's *SOCOM: U.S. Navy Seals* (2002), which allowed players to verbally coordinate tactics via a USB-connected headset device, further narrowing the divide between computer games and console gaming.

Although the PlayStation brand continued to enjoy a position of industry dominance, the PlayStation 2 did not remain unchallenged for long with the 2001 release of two new competitors: the Nintendo GameCube and the Microsoft Xbox. The latter console's launch coincided with that of *Halo: Combat Evolved* (2001), a first-party game developed by Bungie that would complete the work begun by *Goldeneye 007* a generation earlier, cementing the first-person shooter as a mainstay of console gaming and bringing with it a resurgence in the popularity of four-player split-screen shootouts. In 2002, Microsoft launched its for-pay online gaming service, Xbox Live, enabling death matches on a global scale in time for the release of *Halo 2* (2004). Microsoft also succeeded in securing exclusive titles analogous to major PlayStation brands, with Tecmo's *Dead or Alive 3* (2001) offering an alternative to *Tekken* and Bizarre Creation's *Project Gotham Racing* (2001) to *Gran Turismo*. The Xbox also found a major hit in Ubisoft's *Tom Clancy's Splinter Cell* (2002), a high-tech espionage thriller that pushed console graphics to new levels of realism with its dynamic lighting system. While Microsoft's early attempt to establish a fantasy adventure franchise with Adrenium Games' *Azurik: Rise of Perathia* (2001) failed to attract an audience, Lionhead Studio's *Fable* (2004) drew praise despite some compromise of creator Peter Molyneux's expansive original vision of a completely open-ended fantasy experience.

Nintendo, meanwhile, struggled during this period to find an audience for the GameCube. The console's launch bucked established tradition by lacking an accompanying Mario game, opting instead for *Luigi's Mansion* (2001), a spin-off that saw Mario's sibling trapped in a house infested with spirits that could be fended off using a modified vacuum cleaner. A new Mario title soon followed with *Super Mario Sunshine* (2002), a series anomaly in which Mario wielded a water cannon to combat enemies and solve puzzles, along with a new Shigeru Miyamoto creation *Pikmin* (2001), in which the player assumed the role of a spaceman commanding oversized plant life on an alien world. Nintendo scored a considerable third-party coup with Capcom's announcement that *Resident Evil* would become a GameCube exclusive, a move seen as contrary to Nintendo's child-friendly image. The publisher released *Resident Evil* (2002), a high-resolution remake of the PlayStation original, along with prequel *Resident Evil Zero* (2002) and sequel *Resident Evil 4* (2005), the latter a highly acclaimed reinvention of the series' traditionally awkward control mechanics. Also catering to older gamers was Retro Studies' reinvention of the venerable *Metroid* franchise as a first-person shooter, *Metroid Prime* (2002), while *The Legend of Zelda* received both a cartoon-inspired makeover that alienated some fans in *The Wind Waker* (2003) and a swan song for the GameCube in *Twilight Princess* (2006), a game that was released simultaneously on Nintendo's next console, the Nintendo Wii.

It was Microsoft that made the first move to usher in the next generation of consoles, releasing the Microsoft Xbox 360 in 2005. The Xbox Live service became an increasingly integral part of the second Xbox's appeal, hosting millions of games of *Halo 3* (2007) and Activision's *Call of Duty 4: Modern Warfare* (2007). The service expanded its reach by ranking player achievements within individual games—which in turn fed into a cumulative Gamerscore—and launching the Xbox Live Arcade, where smaller games, including numerous independently developed titles, such as Jonathan Blow's *Braid* (2008) and Playdead Studios' *Limbo* (2010), were available for download. The console also boasted an impressive lineup of shooting games, including Epic Games' science fiction military epic *Gears of War* (2006) and 2K Games' *Bioshock* (2006), a sophisticated dystopian horror experience that stranded the player in a ruined underwater city. *Rock Band* (2007), from Electronic Arts and MTV Games, was an evolution of developer Harmonix's previous Activision-published hit *Guitar Hero* and proved immensely popular among both hardcore and casual players, augmenting the guitar controller of the older game with karaoke vocals and drum pads that encouraged groups of friends to jam in unison. The Xbox 360 sold well, although its reception was marred somewhat by hardware issues that plagued the console in its earliest iteration, with users dreading the "red ring of death" that signaled their system had overheated and become inoperable.

The Sony PlayStation 3 reached the market roughly a year after the Xbox 360 and was positioned by the company as a home entertainment hub in addition to a video game console. The PlayStation 3 utilized the Blu-ray format, allowing the console to serve as a high-definition movie player, and unlike the Xbox 360, all models boasted a built-in hard drive. However, the resultant high price of the console limited sales prior to 2009, when a hardware redesign was accompanied by a price drop. Sony's highly touted Cell processor was also very powerful but notoriously difficult to work with, resulting in third-party games that largely performed better on the 360. First-party titles fared better, however, and included action games of unprecedented polish and dynamism—among them Naughty Dog's *Uncharted: Drake's Fortune* (2007) and *The Last of Us* (2013)—while Sony's attempt to challenge Microsoft's impressive lineup of shooting games included titles such as Insomniac Games' *Resistance: Fall of Man* (2006) and Guerilla Games' *Killzone 2* (2009). Sony also strove to match Microsoft's Xbox Live service with its own PlayStation Network, home to highly experimental titles such as thatgamecompany's *Flower* (2009) and *Journey* (2012). Sony Computer Entertainment Europe, meanwhile, launched a fresh property in Media Molecule's *Little Big Planet* (2008), a multiplayer platform game that allowed players to construct their own levels and publish them online.

Nintendo, on the other hand, made a bold gamble with the design of the Wii, opting out of direct competition with Microsoft's and Sony's graphically intensive, online-focused machines and instead offering a revolutionary motion-control system with a controller dubbed the Wii Remote. This popular innovation emphasized casual fun and off-line multiplayer experiences, allowing novice gamers to easily pick up golf, bowling, and other pastimes in *Wii Sports* (2006). Meanwhile, familiar multiplayer diversions were released in the form of *Mario Kart Wii* (2008) and *Super Smash Bros. Brawl* (2008), and even *Super Mario Galaxy* (2007) and *New Super Mario Bros. Wii* (2009) both included a multiplayer component. Nintendo branched out further into the casual games marketplace with *Wii Fit* (2008), a game that led users through a series of exercise routines and then graded their performance. Conversely, *The Legend of Zelda: Twilight Princess* (2006) and *Metroid: Other M* (2010)—the latter a cooperative venture between Nintendo and *Dead or Alive* developer Team Ninja—highlighted the system's relatively sparse offerings aimed at the hardcore demographic. Nintendo's gambit paid off, however, as the Wii proved wildly successful; in 2010, Sony and Microsoft both released motion-control devices (the Move and the Kinect, respectively) as supplements to their own consoles.

These innovations would both carry over to their manufacturers' next consoles, the Sony PlayStation 4 and Microsoft Xbox One, both released in 2013 in North America and 2014 in Japan. The Kinect originally came bundled with the Xbox One, a move to position the console as a modern home entertainment hub that proved unpopular and signaled a reversal of Sony's and Microsoft's fortunes in the new generation. The PlayStation 4 quickly established a dominant lead over its rival, thanks in no small part to Sony's extensive lineup of high-profile exclusive titles, among them Naughty Dog's *Uncharted 4: A Thief's End* (2016), Guerrilla Games' *Horizon Zero Dawn* (2017), and Sony Interactive Entertainment Santa Monica's *God of War* (2018). The latter revamped the gameplay of previous iterations and anchored the bloodshed with a more nuanced narrative centered around protagonist Kratos's newfound fatherhood, emblematic of a movement to reinvent established series as many high-profile franchises grew stale over the course of numerous sequels. Similarly, Id Software's *DOOM* (2016) delivered a simulacrum of vintage shooting thrills with deceptively cutting-edge design innovations to breathe new life into a franchise entering its third decade, and Capcom's *Resident Evil 7: Biohazard* (2017) scaled back the series' horror spectacle while simultaneously making the jump to virtual reality (VR). PlayStation VR gave Sony's Move controllers a new lease on life in tandem with a headset powered by the PlayStation 4 itself. The device launched midway into the console's life cycle and was not immediately a runaway success, but critically acclaimed titles that included Sony Interactive Entertainment Japan Studio's *Astro Bot Rescue Mission* (2018) and *Tetris Effect* (2018)—the latter a reinvention of the iconic puzzle game developed by Monstars Inc./Resonair and produced by *Rez* (2001) and *Lumines* (2004) creator Tetsuya Mizuguchi—allowed it to build an audience over time.

The same could not be said of the Kinect, initially seen as an unnecessary and expensive accessory and ultimately removed from the Xbox One as a cost-cutting measure. By that time, however, extensive damage had already been done to Microsoft's dominance in the console arena, and the Xbox One's comparative lack of compelling exclusive titles did little to prevent Sony from reclaiming its market lead with the PlayStation 4. Previously dependable developers Bungie and Epic could no longer be counted on by Microsoft, with the former abandoning the exclusive *Halo* series to release the multiplatform *Destiny* (2014) and the latter shifting focus from the exclusive *Gears of War* series to the multiplatform, and massively successful, *Fortnite* (2017). Both franchises saw games released on the console, with *Halo 5: Guardians* (2015) developed by 343 Industries and *Gears of War 4* (2016) by the Coalition, but both failed to recapture the enthusiasm generated by their predecessors. Microsoft released a more powerful version of the Xbox One, the Xbox One X, in 2017, a year after Sony's release of the PlayStation 4 Pro. Both consoles' primary selling point was the ability to output at 4K resolution, but this midgenerational stopgap did little to advance Microsoft's position relative to Sony.

Nintendo saw a fall and subsequent rise of its fortunes over the same time period, beginning with the 2012 release of the Nintendo Wii U, a console that roundly failed to recapture the appeal of its predecessor. A hybrid device of sorts, the Wii U connected to a television in the manner of traditional consoles but also included a supplemental tablet screen that could both augment and replace the television screen. This concept proved confusing and unappealing to the audience that had made the Wii a mass-market phenomenon. Nintendo would refine the basic concept of the Wii U to far greater success with the 2017 release of the Nintendo Switch, a handheld unit that could be connected to a television and came bundled with multiple detachable controllers that enabled easy multiplayer gaming. The Switch gave Nintendo the opportunity to release overlooked Wii U franchise entries such as *Mario Kart 8* (2014; released on the Switch in 2017 as *Mario Kart 8 Deluxe*) to a wider audience and to release a sequel, *Splatoon 2* (2017), to the Wii U's lone new intellectual property of note, paintball shooter *Splatoon* (2015). *The Legend of Zelda: Breath of the Wild* (2017) was another entry in the franchise released simultaneously on subsequent Nintendo consoles and, along with *Super Mario Odyssey* (2017), fit the trend of reinventing beloved franchises, augmenting their series' evergreen appeal with seamlessly integrated open-world game design. The Nindies program, another holdover from the Wii U, allowed the Switch to become many gamers' platform of choice to experience titles such as *Stardew Valley* (2016) and *Celeste* (2018) at a time when the indie scene was rapidly innovating in ways largely neglected by more established developers.

Ben Gill

See also: Generations of Technology

Further Reading

Gizmodo Media Group. Kotaku—The Gamer's Guide website. Accessed September 6, 2020. Available at https://kotaku.com.

Newman, James, and Iain Simons. *100 Videogames*. London: BFI Publishing, 2007.

Raessens, Joost, and Jeffrey Goldstein, eds. *Handbook of Computer Game Studies*. Cambridge, MA: MIT Press, 2005.

Contemplative Games

Among the home video games of the mid-1970s, there were some games, like text adventures, that were slower paced and allowed players to think about what they were doing, especially when puzzles had to be solved. Such game moments were precursors of game situations and environments that would be deliberately designed to promote player contemplation.

During the 1990s, video game graphics grew sophisticated enough to create three-dimensional environments that could allow players to vicariously explore locations. Combined with a slow pace or user-controlled pace and situations that left the player pondering what to do, these games were able to produce a contemplative state of gameplay that was a highly immersive experience for many players.

Among the first and best-known contemplative games of the 1990s was Cyan's *Myst* (1993), in which the player's character (the game is from a first-person perspective, with an implied avatar) is left on a lonely island without being given any objective or goal. The player wanders the island, discovering messages, objects, and machines, and must figure what to make of it all. The places encountered are quiet and still, with only ambient sounds (and occasionally ominous music enhancing the mood) and very little movement visually (only a few animated details, such as a turning windmill or a flitting butterfly, keep the visuals from seeming frozen). As a puzzle game, *Myst* promotes a thoughtful, quiet, and careful approach to life that could easily be applied to areas of one's life outside the game. *Myst* became the best-selling computer game of all time, a title it held until 2002, demonstrating that contemplative games can be as popular as action-based games.

Other contemplative games include video artist Bill Viola's *The Night Journey* (2007), which has been included as a part of museum exhibitions since its debut at SIGGRAPH and became commercially available in 2018. *The Night Journey* has grayscale imagery of a computer-generated landscape that is softened and filtered into a murky and motion-blurred slow-moving hypnotic experience.

While Bill Viola is primarily a video artist, not a game designer, there are more commercial games that also deal with such experiences. Jenova Chen, a cofounder of thatgamecompany, is known for more contemplative games and has led the team that created *Cloud* (2005), *flOw* (2006), *Flower* (2009), and *Journey* (2012). *Cloud* is about a boy in a hospital bed who dreams of flying, while in *flOw*, players steer a simple geometric organism that can devour other smaller organisms and objects, enlarging it as it adds material to itself (or loses it). Due the abstract graphics, the actions are not violent or aggressive but promote a quiet, contemplative state, similar to that of viewing fish in an aquarium. *Flower*, a spiritual successor to *flOw*, has the player controlling the wind to blow flower petals around a meadow. It was designed more with the player's emotional experience in mind than any objective or goal. Finally, *Journey* is about a lonely journey across a desert and to the top of a mountain and spiritual growth that occurs along the way. Just as thatgamecompany was going bankrupt after releasing *Journey*, the game became the best-selling PlayStation Network game of all time.

Another contemplative game set in an expansive world is David OReilly's *Everything* (2017), which was designed to encourage the player to consider the connectedness of the universe. Players can "become" anything in the game, from plants and animals roaming the wilderness, to bugs and even microbes at the microscopic end of the scale, to landmasses, planets, stars, and galaxies at the macroscopic end of the scale, demonstrating the connectedness of everything in the universe.

Many games of the adventure genre involve a great deal of interaction with their worlds, and some are even called *walking simulators* due to the amount of time spent walking around an environment. Such games often value mood and atmosphere over action and can thus be seen as contemplative in nature, if their environments become the cause of reflection and contemplation, either deliberately or inadvertently.

While many contemplative games are nonnarrative, story-based games can also be designed to encourage contemplation, such as *Myst* (1993) and *Riven: The Sequel to Myst* (1997). In both cases, the player pieces the backstory together as fragments of it are uncovered. In other games, such as *Journey*, or *Walden, a Game* (2017), the player's own experience becomes the narrative of the game. Contemplative games provide a different experience from action-based games and demonstrate that video games are capable of conveying a wealth of different experiences, even reaching into the sublime.

Mark J. P. Wolf

See also: *Myst*; thatgamecompany; *Walden, a Game*

Further Reading

Navarro Remesal, Víctor. "Slow Gaming, Notes for a Contemplative Game." *O Magazine*.

Wolf, Mark J. P. "Contemplation, Subcreation, and Video Games." *Religions* 9, no. 5. In the special issue: *The Sacred & the Digital: Critical Depictions of Religions in*

Video Games, April 26, 2018: 142. Available at https://doi.org/10.3390/rel9050142.

Controllers

A video game controller is a device used to input commands into a video game system and, in some cases, to output feedback to the user. Controllers are used by players to interact with video games to control or manipulate elements of the game. Games are generally designed for a specific controller or set of controllers. Generic controllers include a mouse and keyboard combination, a joystick, and a gamepad, which are frequently chosen for player familiarity. Other games can require genre-specific or even game-specific controllers, such as steering wheels or musical instruments. Older controllers tended to be connected to the game system via wires, whereas modern controllers tend to be wireless.

COMMON TYPES OF CONTROLLERS

Arcade cabinet controllers are often designed for use with one particular game, requiring a customized cabinet to house the game. The most common types of arcade cabinet controllers consist of buttons and joysticks. Other types of common arcade cabinet controllers include a steering wheel and foot pedal combination for racing games, mounted guns for shooting games, boxing gloves, skis, snowboards, fishing poles, and dance pads.

Camera controllers observe the player and surrounding environment, usually from the perspective of the display, and use images as input for a game (as opposed to light guns, which employ controller-mounted cameras). Some of the better-known examples of camera systems include the Sony PlayStation 2 EyeToy, the PlayStation 3 Eye (and Move), the Microsoft Xbox 360 Kinect, and the Nintendo DSi, which features a built-in camera. Cameras use different techniques to detect objects in the environment, such as edge detection, motion detection, and color detection (like green-screen technology). Stereo cameras or multicamera arrays can infer z-axis depth, allowing the system to know where an object is in three-dimensional space. Modern camera systems can track the user's body movements and detect facial movements and expressions.

Gamepads are the most common form of game controllers. Typical gamepads are held by both hands and feature several buttons and joysticks as inputs. Directional pads (D-pads) are four-way buttons that are usually used for navigational purposes and have an arrow in each of the cardinal directions corresponding to movement. Most directional pads can sense eight-way directional movement and are often found on the left-hand side of the controller. Stand-alone buttons are typically found on the right-hand side of gamepads and are often labeled with letters or symbols (such as A and B or a circle and triangle). These buttons are generally used to execute actions in a game. Shoulder buttons, or triggers, are buttons located on the top side of the controller. Shoulder buttons are frequently used in games for firing weapons or for rotational purposes.

Many gamepads feature several reserved buttons that have standardized uses and are found in the middle of the controller. The start button almost always pauses games or brings up a menu. A select or back button is often used in menu navigation. Modern consoles feature a button for connecting wireless controllers to the system itself and for bringing up system menus. In addition to buttons, many gamepads feature one or two joysticks or thumbsticks. Modern gamepads may have several other embedded devices as well, including vibrator monitors for haptic feedback, orientation and acceleration sensors, speakers for audio feedback, and ports for connecting other peripherals, such as headsets or secondary controllers.

The *keyboard* and *mouse* are both standard input devices for computers and are the only commonly used game controllers not specifically created with the express purpose of playing games. Because of the large number of keys on it, the keyboard can be used to input more commands than most other controllers, whereas the mouse is a fast and highly accurate pointing device (the mouse's control mechanism was developed from the trackball, an early pointing device used in the arcade). Common control mappings have evolved, such as using the W, A, S, and D keys for movement, and many games allow player-defined mapping of important or common functions to specific mouse buttons or keyboard keys. In many games, the keyboard is used to move a character in a virtual world, and the mouse is used to control where the character looks or aims. Many games allow players to remap, or customize, controls that use keyboard and mouse input.

A *light gun* is a controller that mimics the behavior of a firearm, allowing players to shoot objects on the screen. Light guns consist of a camera mounted in a gun-shaped device. The camera observes reference points (either a device mounted by the screen, such as a sensor bar, or the screen itself) to determine what the light gun is aiming at. The Magnavox Odyssey was the first system to introduce a light gun controller and was followed many years later by Nintendo's Zapper for the Nintendo Entertainment System (NES) and the Super Scope for the Super Nintendo Entertainment System (SNES). The Nintendo Wii Remote effectively behaves as a light gun controller for the Wii.

Motion-sensing controllers embedded accelerometers and gyroscopes to detect player motion and orientation. The Nintendo Wii Remote and PlayStation Sixaxis and Move are examples of motion-sensing controllers.

Musical instrument controllers are devices that mimic the form and simulate the function of a musical instrument. These controllers are often used in conjunction with rhythm games and tend to be specific to the genre. Common controllers include microphones, guitars, drums, and piano keyboards.

Touchscreen devices are often seen on portable devices with small screens, such as the Nintendo DS and mobile devices like the Apple iPhone. Touchscreens allow users to directly interact with the screen using their fingers or a stylus. These interfaces can double as buttons or joysticks by designating areas on the screen for such functionality, although they do not offer the same pressure feedback when pressed. Touchscreens are frequently used for drawing or writing purposes.

Balance boards sense pressure from players standing on them and are most commonly used for fitness and snowboarding games.

Dance pads generally consist of an array of large flat buttons that players can step on to activate and are frequently used with arcade (or arcade style) dancing games.

Brain-controlled devices are currently in development and promise to allow users to control (or partially control) games through thought alone. These devices detect electrical stimulation in the head or facial regions. As of 2018, these devices are very limited in functionality and are not in use by mainstream gaming.

Eitan Glinert

See also: Peripherals

Further Reading

Baba, Tetsuaki, Taketoshi Ushiama, Reiji Tsuruno, and Kiyoshi Tomimatsu. "Video Game That Uses Skin Contact as Controller Input." *SIGGRAPH '07: ACM SIGGRAPH 2007 Emerging Technologies*, August 2007. Available at https://dl.acm.org/doi/abs/10.1145/1278280.1278285.

Bussler, Mark. *Ultra Massive Video Game Controller Guide*. Part 1, *Ultra Massive Volume 5*. Victoria, Australia: Inecom, 2018.

Conventions

Any definition or model of games will put rules at the top of its features. To play is to accept to engage in a rule-based system. However, one should not forget about another cardinal kind of regulation: conventions.

Rules and conventions are often used interchangeably (among others, by Roger Caillois in his seminal *Man, Play, and Games* [1958] 1961). But as rules are constitutive, rigid, and cannot be broken (without destroying the game or cheating), conventions are more implicit, flexible, and can be ignored; they change over time, and as some disappear, others come to be known. Even if people can learn rules just by playing a video game and through trial and error, experience and practice are the main ways by which conventions are figured out and become meaningful. Rules can be present in one game, but conventions have to be present in previous works. Consequently, along with mechanics and controls, rules themselves can become conventional.

There are many types of conventions (and it is unmanageable to name all instances). Genre conventions allow players to have a "horizon of expectations" about places, narratives, and courses of action. Set in the American Old West at the American frontier, *Red Dead Redemption 2* (2018) commonly stages a conflict between wilderness and civilization as well as many fights between sheriffs and outlaws drawing Colt six-shooters, wearing cowboy hats, riding horses, and drinking in saloons. Gender conventions, or stereotyping, put the men in control and in the role of protector (yet, one widow will become of the toughest lawbreaker and bounty hunter, therefore breaking the convention). Following audiovisual conventions, extradiegetic music is heard during gunfights, and hitting bullets splatter blood. There is a minimap on the screen to ease the navigation of the open world. The narrative convention of the action-adventure genre divides the story into chapters and various missions to be completed to advance; checkpoints, or autosaves, protect the gamer from having to restart an assignment from the beginning.

Video games undeniably have conventions based on gameplay. Acquiring experience points to level up playable characters is a task considered to be standard in role-playing games (RPGs). Scrolling is usually toward the right in platform games. Actually, in fiction as in the magic circle of ludic activities, there are things and behaviors that are not like the everyday world. They are socially and culturally constructed. For example, to stay alive in a real battlefield, it is a good approach to camp or to stay in one good vantage point to kill the enemies, but this not an accepted tactic in a deathmatch of an online first-person shooting game. Although the setting of *Days Gone* (2019) is two years after a zombie apocalypse and the main protagonist does not inhabit the world alone and is not the only one scavenging for valuable items, ammunition is still found in the trunk of every police car, med kits are found in the back of ambulances, and fuel tanks are left in the back of tow trucks.

One needs to accept what is happening and what could and should be done, or not done, in video games; knowing and understanding conventions makes the experience more understandable and enjoyable.

Bernard Perron

See also: Game Design; Rules

Further Reading

Arsenault, Dominic. "Video Game Genre, Evolution and Innovation." *Eludamos* 3, no. 2 (2009). Available at https://www.eludamos.org/index.php/eludamos/article/view/65.

Perron, Bernard. "Conventions." In *The Routledge Companion to Video Game Studies*, edited by Mark J. P. Wolf and Bernard Perron, 74–82. New York: Routledge, 2014.

Cooperative Gameplay

Unlike competitive gameplay, cooperative gameplay requires players to work together as a team. To succeed, they must gain a mutual understanding of each other's style of play, anticipate each other's moves, and be willing to sacrifice for the good of the team. Early arcade games, especially shooting games, put forward the impression that video games are not, by nature, cooperative. *PONG* (1972), for instance, immediately became the template for video games as a player-versus-player activity, one which was competitive, not cooperative. Also, many early coin-op games, largely for economic reasons, allowed only one player at a time to play. Because of that, most early video games displayed a single tally of high scores that created an atmosphere of solo competition. This, in turn, helped to establish the image of video game player as a loner.

Even so, cooperative games appeared early on in video game history. The very first cooperative video game was a doubles version of *PONG*, Atari's *PONG Doubles* (1973). In this configuration, two sets of players could play team against team. In particular, the creation of teams added an important element to video gaming; when one player was unable to return the ball, there was a chance that the player's partner could make the save, thus promoting camaraderie and a bond between players.

Although single-player games were the norm, notable exceptions were games that featured artificial intelligence (AI), such as Howard Delman's *Fire Truck* (1978), the first game to offer a computer-controlled companion. *Fire Truck* was also the first video game to feature tethered play, gameplay in which players are not allowed to harm their own teammates or, in other cases, move outside of a prescribed region, usually the viewable display area. In the case of *Fire Truck*, the tether between players was tangible. On-screen, the game presented a top-down view of an articulated hook-and-ladder truck, and one or both players maneuvered the truck to avoid crashes. Two years later, *Rip Off* (1980), designed by Tim Skelly for Cinematronics, would offer two players the opportunity to play as an unfettered team, free to maneuver and shoot as they saw fit. Soon after that, *Space Duel* (1982), created by Owen Ruben for Atari, joined the ranks of early cooperative play games. His entry visibly tethered two players together in that game's two-player mode, forcing both players to stay in step with each other.

Leaving aside artificial players, cooperative games do have an obvious drawback: they require at least two players. In the past, this might have been a hurdle, but with the rise of gameplay over the internet, finding like-minded players will not be a deterrent now or at any time in the future. Many early online multiplayer games were fantasy role-playing games (RPGs) inspired by card games such as *Dungeons & Dragons* (1974), a gaming genre that first appeared in video game arcade form as Ed Logg's *Gauntlet* (1985). Although multiplayer, *Gauntlet* was not strictly cooperative because each player had his or her own score and rewards. However, it was this cooperative/independent gameplay form that transmogrified into other genres and media spin-offs. In many such games, a quest scenario is employed to motivate the narrative of the game. Ultimately, players spend most of their time tending to their personas and enhancing their personal status within the game.

So how cooperative are cooperative games? The answer depends on the game and the rules enforced within it. Demonstrating the variety of cooperative gaming styles, the now-defunct website Digitalbattle.com chose as its top ten cooperative games *New Super Mario Brothers Wii* (2009), *Halo 3: ODST* (2009), *Little Big Planet* (2007), *Left 4 Dead 2* (2009), *Army of Two* (2008) and *Army of Two: The 40th Day* (2010), *Guitar Hero* (2005), *Crackdown* (2007) and *Crackdown 2* (2010), *Borderlands* (2007), *Gears of War* (2006), and *World of Warcraft* (1994). As this list shows, cooperative play has both a strong following and can be adapted to many genres and platforms. As long as there are two human beings who are in the same room or who can access a computer at the same time, there will be cooperative play video games.

Even within strongly antagonistic games, there is always the possibility of cooperation. The only way to prevent that would be for the rules of the game to completely prevent cooperation of any kind, and this would be highly unlikely. Human beings are social animals, and even at our worst, we will always find a way to cooperate when we wish to.

Tim Skelly

See also: Game Design

Further Reading

Birnbaum, Ian. "The Best Co-Op Games: Grab a Friend and Enjoy the Best Co-Op Games the PC Has to Offer." *PC Gamer*, February 13, 2020. Available at https://www.pcgamer.com/the-best-co-op-games/.

Loveridge, Sam. "The 25 Best Co-Op Games to Play Right Now." GamesRadar+, February 13, 2020. Available at https://www.gamesradar.com/best-co-op-games/.

Cow Clicker

Cow Clicker (2010) was a Facebook game about Facebook games created by Ian Bogost. The social game was both a parody of and a commentary on Facebook games of the sort popular during this period, such as *FarmVille* (2009).

In the game, players were provided with a cartoonish cow, which they could click on. The cow mooed, and a point (a "click") was recorded. Six hours later, the player could click the cow again. Players could buy custom premium cows with in-game currency or through microtransactions. They could also purchase the ability to override the timer and click more often than every six hours. Players could invite friends' cows into their pasture, and each click of one cow in a pasture would record a click for the other players in that pasture as well. Bogost billed the game as "Facebook games distilled to their essence," and he insisted that the game was meant both as a "playable theory" of social games and "an earnest example of that genre."

The game was inspired by a schism that had erupted in the game development and playership communities between "traditional" games of the console, PC, and even mobile sort and "social" games of the type that had been popularized on Facebook. The success of *FarmVille,* which had upward of eighty million users at its peak, had made the genre both culturally popular and highly lucrative. At the same time, developers like Zynga had developed a reputation for using unsavory business practices to acquire and hook users. As the journalist Dan Terdiman (2010) observed, creators were upset at the massive profits companies like Zynga were raking in.

Bogost (2004) had written positively about the future potential of asynchronous, casual multiplayer games, which is one way of defining the genre to which Facebook games belonged. But in evaluating the latter genre, Bogost (2010) suggested four ways that social games were socially disturbing: (1) they transformed friends into resources for later use, both by players and developers; (2) they relied on the compulsion to return to the game; (3) they presented an entertainment experience that was mostly empty effort, where players could pay to avoid performing that effort; and (4) they required that players play, and developers support, the games on time frames inhospitable to ordinary life.

Cow Clicker struck a nerve and enjoyed some success as a viral cultural phenomenon over the year and a half that followed its release. Snared by the very criticisms he had intended the game to highlight, Bogost became obsessed with updating and supporting the game. Many specialty cows were created along with various extensions and add-ons to the gameplay, including an officially endorsed cow-clicking version of PopCap's popular casual game *Bejeweled* (2001). Eventually, Bogost shut the game down by means of a complex, global alternate reality game (ARG), which revealed that the cows would be raptured in a "cowpocalpyse." At the specified date and time, all the cows disappeared from *Cow Clicker*, although players could still click on the empty space where a cow used to be. As of 2019, the game continues to operate in that capacity.

The story of *Cow Clicker* was covered in the games press (Thomas 2011; Alexander 2011) and the popular media, including *Wired* magazine (Tanz 2011) and on *All Things Considered* (National Public Radio 2011), among others. Years later, its impact continued to be recorded. The genre of idle games or clicker games owes some of its conceptual and design origins to *Cow Clicker*; in his book *Play Anything* (2016), Bogost reflects on the ways those genres, now successful and thriving, had interpreted the same design patterns in generous rather than cynical ways. At the same time, there is reason to believe that cynicism was warranted. The journalist Brian Crecente (2014) also reported on the ways *Cow Clicker* had predicted "the seedy underbelly of social gaming" years before the tides turned on Facebook, Zynga, and their ilk. And after the Cambridge Analytica scandal, in which it was revealed that Facebook apps had been extracting user data in ways that helped contribute to misinformation campaigns in the 2016 U.S. presidential election, Bogost (2018) used *Cow Clicker* as an object lesson in how that capacity was built into every social game and app of the period. "Every Facebook app—even the dumb, innocent ones," Bogost wrote, "collected users' personal data without even trying."

Ian Bogost

See also: Casual Games

Further Reading

Alexander, Leigh. "The Life-Changing $20 Rightward-Facing Cow." Kotaku, October 3, 2011. Available at https://kotaku.com/the-life-changing-20-rightward-facing-cow-5846080.

Bogost, Ian. "Asynchronous Multiplay: Futures for Casual Multiplayer Experience." *Proceedings of the Other Players Conference on Multiplayer Phenomena*, Copenhagen Denmark, December 2004. Available at http://bogost.com/downloads/I.%20Bogost%20-%20Asynchronous%20Multiplay.pdf.

Bogost, Ian. "Cow Clicker: The Making of Obsession." Bogost.com, July 21, 2010.

Bogost, Ian. “My Cow Game Extracted Your Facebook Data.” *The Atlantic*, March 22, 2018. Available at https://www.theatlantic.com/technology/archive/2018/03/my-cow-game-extracted-your-facebook-data/556214/.

Bogost, Ian. *Play Anything: The Pleasure of Limits, the Uses of Boredom, and the Secret of Games*. New York: Basic Books, 2016.

Crecente, Brian. “How Cows Predicted the Seedy Underbelly of Social Gaming.” Polygon, July 25, 2014. Available at https://www.polygon.com/2014/7/25/5937009/cow-clicker-2-sequel.

Hayward, David. “Zynga: The Future, or Just a Bit of It?” Gamasutra, March 3, 2010. Available at https://www.gamasutra.com/blogs/DavidHayward/20100315/4670/Zynga_The_Future_Or_Just_A_Bit_Of_It.php.

National Public Radio. “Cow Clicker Founder: If You Can’t Ruin It, Destroy It.” *All Things Considered*, November 18, 2011. Available at https://www.npr.org/2011/11/18/142518949/cow-clicker-founder-if-you-cant-ruin-it-destroy-it.

Tanz, Jason. “The Curse of *Cow Clicker*: How a Cheeky Satire Became a Videogame Hit.” *Wired*, January 2011. Available at https://www.wired.com/2011/12/ff-cowclicker/.

Terdiman, Dan. “Why Zynga Ticks Off the Games Industry.” CNET, April 12, 2010. Available at https://www.cnet.com/news/why-zynga-ticks-off-the-games-industry/.

Thomas, David. “Poking at Cow Clicker.” *Edge*, May 2011: 76–79.

Tsotsis, Alexia. “Why Clicking Cows Brings Us Closer Together.” TechCrunch, July 26, 2010. Available at http://techcrunch.com/2010/07/26/cow-clicker-facebook/.

Crash of 1977

The great video game industry crash of 1983 was not the industry’s first; the crash of 1977, although not as big or as long-lasting, was the first to test the home video game industry. In some ways, it was a warning to the industry that was predictive of the great crash of 1983, with which it shared similar conditions: burgeoning commercial success encouraging high expectations, cheapened product glutting the marketplace, tough competition forcing the slashing of prices, and technical advances resulting in a new generation of technology that quickly outmoded older systems and sent them into obsolescence. The 1977 crash itself was even foreseen by some, based on the patterns followed by other electronics industries, like those of electronic calculators, digital watches, and CB radios, in the years following the appearance of large-scale integrated (LSI) circuits and microprocessors, which video games used as well.

After the success of the Magnavox Odyssey, the first home video game system, and *PONG* (1972), its arcade imitator, *PONG*-like games began coming out for the home and the arcade, and the video game industry began its phenomenal growth in the early 1970s. By the end of 1975, the industry was booming. Games sold out in stores, and demand outpaced supplies. But the real catalyst for the boom that preceded the crash was the AY-3-8500 chip produced by General Instruments (GI) in early 1976. The AY-3-8500 had all the circuitry necessary for a video game on a single chip, greatly simplifying video game production and tempting dozens of companies, in Europe and the United States, to enter the video game industry. Coleco was the first company to order the chip, and many other companies followed. The cost of the chip was around $5, making it possible to produce home video game systems with retail prices of under $100 that still had enormous profit margins.

The rush to get systems on the market resulted in many second-rate products, and some did not even bother to include copyright notices on their boxes. Around seventy companies were competing for market share, and even systems that are considered obscure today sold well; for example, National Semiconductor's Adversary home game system sold more than two hundred thousand units in 1976. The Christmas season of 1976 set a record for the home video game industry, with estimated retail sales of about $150 million, and many stores experienced shortages.

The craze continued into 1977, but one system from 1976 was different. The Fairchild Channel F home video game system was cartridge-based, as opposed to having only built-in games like all the other systems. After purchasing this system, consumers could buy new games for it as new cartridges appeared instead of having to buy new systems. Game makers took note and realized this was the future of the industry. RCA readied its cartridge-based Studio II system for release later in the year, and Atari would release its Atari VCS (later renamed the 2600) later in the year as well. Home computers were also developing, and many would come to include a slot for cartridges, as gaming was one of the reasons that many people bought home computers. Handheld games also appeared around this time and would provide further competition.

By January 1977, GI had shipped more than seven million AY-3-8500 chips, and new chips were being planned. Consumers, tired of the same *PONG*-like games and waiting for more advanced games and game systems, pulled back just as another surge of new games came on the market. The games were already selling at reduced prices, and the sudden drop in sales led to the first industry crash. Companies lost money, and some, like Allied Leisure, went bankrupt. Even three of the major game producers who made their own chips, Fairchild, National Semiconductor, and RCA, quit production and left the industry.

With the release of the Atari VCS in October 1977, the industry began to bounce back. Although Atari's system was not the first cartridge-based one, Atari was already known for its arcade games, and the company was quick to license other arcade hits, most notably *Space Invaders* (1978), which meant that many of the games produced for the VCS had some name recognition from the arcade. Atari also allowed third-party developers to develop games for the VCS, which allowed the game library for the system to grow quickly into hundreds of cartridges. Many companies, like Activision and Imagic, were initially begun as developers for the VCS. In the end, third-party game development and production, eventually resulting in more than one thousand cartridges made for the system, would also keep the Atari VCS in production until its official retirement in 1992, making it one of the most successful consoles in video game history and rejuvenating the home video game system industry as a result.

Although the crash of 1977 had less of an impact than the crash of 1983, it nonetheless provided a warning and demonstrated how unbridled enthusiasm within the industry would not necessarily be followed by consumers, who were looking ahead to what technology was on the horizon rather than adopting every new system and advance as it appeared.

Mark J. P. Wolf

See also: Crash of 1983; History of Video Games

Further Reading

Eimbinder, Jerry, and Eric Eimbinder. "Electronic Games: Space-Age Leisure Activity." *Popular Electronics* (October 1980): 53–59.

Winter, David. "Video Games in Europe: The Early Years." In *The Video Game Explosion: A History from PONG to PlayStation and Beyond*, edited by Mark J. P. Wolf, 47–51. Westport, CT: Greenwood Press, 2007.

Wolf, Mark J. P. "The 1977 Video Game Industry Crash." In *Before the Crash: Early Video Game History*, edited by Mark J. P. Wolf, 81–89. Detroit, MI: Wayne State University Press, 2012.

Crash of 1983

One of the greatest turning points in the history of video games, the North American video game industry crash of 1983, was a sobering turn of events that countered the unbridled optimism of the early days and brought an end to the golden age of arcade video games. Many companies quit producing video games, some went bankrupt, and the few that stayed in the industry had to reassess their positions and concentrate their efforts in a new direction.

By the end of 1981, the arcade video game industry was booming with an estimated income of $5 billion (Langway et al. 1981; Skow 1982). The production of home games and their systems was also at an all-time high, with its market tripling in 1981, and it looked as if it would reach $2 billion by the end of 1982. The largest video game company of the time, Atari, saw revenues of about $415 million in 1980, and even its competitors were doing well. Growth was phenomenal, and more was expected. An article in the May 1982 *Business Week* predicted that the home market "will continue to expand at least until 1985, at which point nearly half of all U.S. homes with television sets will own a video game machine," and CBS Inc., the television network that produced several games, expected the European market for video games to "explode from $200 this year to $800 million by 1983."

Besides CBS, numerous third-party developers flooded the market with games, many of which were derivative, substandard, and cheaply produced. Many new start-up companies appeared, hoping to cash in on the video game craze, and some, like Activision and Imagic, were started by former employees of Atari and Mattel. Board game makers such as Parker Brothers and Milton Bradley and companies from other industries, such as 20th Century Fox and even Quaker Oats, had game divisions and published games hoping for a hit. With so many companies producing hundreds of games, many of which were poor, and home computers coming down in price while more software was becoming available, the video game industry was heading for a crash worse than the crash of 1977.

WARNING SIGNS AT THE ARCADE

By 1982, the video game industry was doing better than ever. Sales of home games had returned, and arcade games were pulling in billions of dollars, with hit games such as *Space Invaders* (1978), *Pac-Man* (1980), and *Defender* (1980) each pulling in hundreds of millions of dollars on their own. Despite all the optimism, the earlier crash led some industry observers to have doubts. Competition between game-producing companies, poor products, consumer and retailer doubts, and improved home computer systems soon began to hurt the video game industry, with some of the first effects appearing in arcade game sales. Hints of a drop in interest came rather early; Atari's Coin-Op $50,000 World Championship, held in Chicago in October 1981, drew only 250 players, when more than 10,000 were expected. By the end of 1982, arcade game profits started to drop. Distributors were overstocked, many arcades would close, and those that remained open would buy fewer new arcade games.

END OF AN ERA

Although the number of video game arcades more than doubled from 1980 to 1982, reaching a peak of about ten thousand arcades, more than two thousand would close in 1983 (Alexander 1983; Mehrabian and Wixen 1983). By the year's end, the home video game market was oversaturated, and consumers were disappointed with the products. Overall, the video game industry's profits in 1983 amounted to $2.9 billion, down about 35 percent from 1982 ("Trend Is Back" 1984). Industry-wide losses totaled about $1.5 billion.

Mattel, which had once been the third-largest video game maker and had $250 million in revenue from its Mattel Intellivision system in 1981, left the market in 1983. Even Atari, with a majority share of the market and the only company producing games for all three market sectors (arcade games, home console games, and home computer games), lost more than a half billion dollars in 1983. In 1984, the home video game system market dried up, and only one new system appeared, Rick Dyer's Halcyon home laserdisc game system—and it was a failure.

The Halcyon system appeared because, in 1983, laserdisc games were seen as possibly rescuing the arcade game industry. Laserdisc games used video graphics stored on laserdiscs, either as background the player flew over, as in Mylstar's *M.A.C.H. 3* (1983), or as animated segments representing a player's actions during the game, as in Cinematronics' *Dragon's Lair* (1983). Although the graphics were improved, gameplay was severely limited because the graphics were already rendered and stored on the discs. In *Dragon's Lair*, for example, there were only a few choices a player could make in any given situation, all of them ready as animated scenes that the player would play next once he or she had made a choice. The games also cost twice as much as standard arcade games and charged players fifty cents a play. In the end, laserdisc games failed to catch on because of the lack of interesting gameplay and higher costs for both players and arcade operators.

The crash finally ended in 1985 when a new system appeared that advanced home video games to a new level. The Nintendo Entertainment System (NES) was already a success in Japan, where it had been released in 1983 as the Nintendo Famicom, and it, along with its large library of games, helped revive the American video game industry and bring an end to the problems it was suffering.

Mark J. P. Wolf

See also: Crash of 1977; History of Video Games

Further Reading

Alexander, Charles P. "Video Games Go Crunch!" *Time,* October 17, 1983: 64.

Langway, Lynn, et al. "Invasion of the Video Creatures." *Newsweek,* November 16, 1981: 90–94.

Mehrabian, Albert, and Warren Wixen. "Lights Out at the Arcade." *Psychology Today,* December 1983: 72.

Skow, John. "Games That Play People." *Time,* January 18, 1982: 50–58.

"The Trend Is Back to Pinball Machines." *Business Week,* May 7, 1984: 37.

"Video Games Are Suddenly a $2 Billion Industry." *Business Week,* May 24, 1982: 78–83.

Crawford, Chris (1951–)

Chris Crawford is an author and computer game designer who designed several noteworthy games for the Atari 8-bit family, Apple Macintosh, and IBM PC. Crawford is also the founder of the *Journal of Computer Game Design* and the Game Developers Conference (GDC). He holds a bachelor's degree in physics from the University of California–Davis (1972) and a master's in physics from the University of Missouri (1975).

Crawford began his career by teaching at the University of California. His first foray into game design was a game titled *Tanktics*, which he designed in 1977 and published for the *Commodore PET* in 1978. The game is notable for being one of the first computer games to simulate the fog of war. Although not a commercial success, Crawford's work on *Tanktics* eventually led to his employment at Atari in 1979.

The first game Crawford created at Atari was *Wizard*. Designed for the Atari VCS 2600, *Wizard* was never released on the home console. It was not until 2005, twenty-five years later, that the game was eventually released on the Atari Flashback 2. After *Wizard*, Crawford began to design games for Atari's 8-bit family of home computers, including *Energy Czar* (1981) and *Scram* (1981).

Crawford soon began experimenting with Atari's hardware-assisted smooth-scrolling capabilities. This led to the creation of *Eastern Front (1941)* (1981), an early example of a wargame that uses a scrolling map display. Using the same game engine, he followed up *Eastern Front* with *Legionnaire* (1982), which utilized real-time tactics as opposed to *Eastern Front*'s turn-based play. *Legionnaire* was actually a rewrite of a game that Crawford had initially written for the Commodore PET in 1979.

Crawford developed an experimental game for the Atari 400 called *Gossip*. *Gossip*'s gameplay was derived from the player's social interaction with seven computer-generated characters. *Gossip* was never officially published, but it stands as a precursor to life-simulation games such as *The Sims* (2000). The last game that Crawford designed for Atari was *Excalibur* (1983), an early example of a strategy game that was innovative for its mechanics of resource management.

Crawford was laid off from Atari during the video game crash of 1983. He began producing games as a freelancer and published with several companies, including Mindscape and Electronic Arts (EA). The first freelance game he created was the geopolitical strategy game *Balance of Power* (1985), which received numerous favorable reviews and became a commercial success, selling more than 250,000 units. Crawford followed with additional freelance titles: *Patton v. Rommel* (1987), *Trust and Betrayal: The Legacy of Siboot* (1987), *Balance of Power: The 1990 Edition* (1990), *The Global Dilemma: Guns & Butter* (1990), *Balance of the Planet* (1990), and *Patton Strikes Back* (1991).

Crawford has written several books on the topic of game design. His first book, *De Re Atari* (1982), was a comprehensive guide to game design on the Atari 8-bit home computer. He also wrote *The Art of Computer Game Design* (1982), the first book dedicated to the theory of video games, and *Balance of Power* (1986), which chronicles the designing of his game of the same title. Crawford has written three additional books on game design in the twenty-first century: *The Art of Interactive Design* (2002), *Chris Crawford on Game Design* (2003), and *Chris Crawford on Interactive Storytelling* (2004).

In 1987, Crawford organized the first Computer Game Developers Conference, which took place in his own living room, with fewer than thirty designers in attendance. Now known as the Game Developers Conference, the conference attracts more than twenty-five thousand attendees per year. Crawford also founded the *Journal of Computer Game Design* in 1988. He served as publisher and editor of the journal until 1996.

On March 23, 2009, Crawford released *Storytron*, an engine for running interactive storyworlds. The system launched with Crawford's sequel to *Balance of Power*, *Balance of Power: 21st Century* (2009).

In 2013, Crawford released the source code of several of his games to the public, including *Eastern Front*, *Legionnaire*, and *Balance of Power*. In June 2018, he made a post on his personal website that stated his departure from the world of digital storytelling. His reasons for exiting included current industry trends and the inevitability of AI game design.

Aaron D. Boothroyd

See also: Game Developers Conference

Further Reading

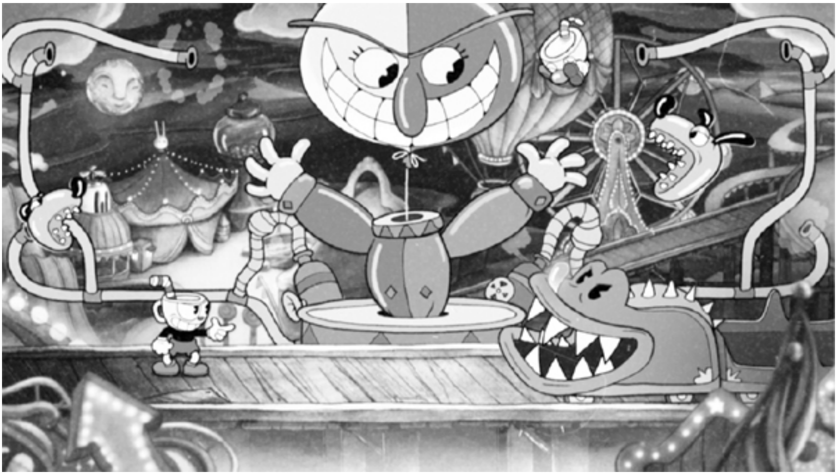
Chris Crawford's personal website. Accessed September 6, 2020. Available at http://www.erasmatazz.com.

Crawford, Chris. *Chris Crawford on Game Design*. Berkeley, CA: New Riders Games, 2003.

Cuphead

Cuphead is a multi-award-winning run-and-gun game from Canadian indie game developer StudioMDHR. It was released in September 2017. Most notable about *Cuphead* is its distinct art style inspired by 1930s cartoons, mimicking the style of Disney and Fleischer Studios from that era. With much dedication to authenticity, the studio used hand-drawn animation and watercolor-painted backgrounds, replicating both the visual style and movement of the early cartoons. The studio also used classical jazz recordings to add to the cartoon effect. As a result, *Cuphead* exudes a strong sense of nostalgia for the era. The game's art and style garnered both positive and negative critical responses; many praised the devotion and quality of the art style, while critic Yussef Cole was concerned that the style and visuals revived the racist caricatures of 1930s cartoons, claiming that the developers had ignored the problematic context of the style (Cole 2017).

Cuphead takes place in the fictional world of the Inkwell Isles. Players can play as brothers Cuphead and Mugman, if playing the local co-operative mode. At the start of the game, the brothers lose a high-stakes game of craps in the Devil's Casino. When the brothers beg for mercy, the Devil strikes a deal with them. Cuphead and Mugman must collect soul contracts from debtors to save themselves. The outcome of the game's plot depends on the player's choice. Once the contracts are collected, they can either hand the contracts over and become the Devil's minions or refuse and fight the Devil to save both their souls and those of the debtors.



A screenshot from *Cuphead,* a game with a graphical style that evokes 1930s hand-drawn animation. (Courtesy of Mark J. P. Wolf)

The game contains two level types: run-and-gun and boss battles. Through the run-and-gun levels, players combat a variety of enemies by shooting bullets, parrying specific objects, and collecting coins. While *Cuphead* is not a platformer (a game centered on running and jumping), the player traverses levels by jumping over enemies and gaps to reach the end, which is labeled by an arrow signpost. Boss battles involved a main enemy with different stages and waves of attacks. In the battles, players must dodge projectiles while shooting to defeat the boss. Upon defeating a boss, players are rewarded with a soul contract. When selecting the boss battle, players can select different difficulty settings, simple, regular, or expert, though players cannot collect contracts on simple difficulty. *Cuphead* garnered some criticism over the game mechanics, with many players claiming the game was too hard.

If the player dies during a level, he or she must restart the entire level again. The player can be hit a maximum of three times (unless the player character's hit points have been boosted with an item) until the hit points (HP) are reduced to zero. At the end of each level, players are given a grade for their performance, taking into account the time taken to complete the level, HP bonus, objects parried, coins collected, and the skill level. The grading system runs from *D–* to *S* and also includes a *P* (pacifist) grade for players who complete the level without killing any enemies (Djordjevic 2017).

Proving games can still be difficult yet rewarding, even when combined with a jovial cartoon aesthetic, *Cuphead* is a standout game. *Cuphead* sets a clear example for many emerging indie game studios as yet another success story.

Courtney Blamey

See also: Animation (Hand-Drawn)

Further Reading

Alexandra, Heather. "*Cuphead* Developers Talk Cut Bosses and What's in the Cups." Kotaku, November 3, 2017. Available at https://kotaku.com/cuphead-developers-talk-cut-bosses-and-whats-in-the-cup-1820126327.

Cole, Yussef. "Cuphead and the Racist Spectre of Fleischer Art." Unwinnable, November 10, 2017. Available at https://unwinnable.com/2017/11/10/cuphead-and-the-racist-spectre-of-fleischer-animation/.

Djordjevic, Pavle. "Cuphead How to Get P Rank—Pacifist Grade." GosuNoob.com, October 2, 2017. Available at https://www.gosunoob.com/guides/cuphead-how-to-get-p-rank-pacifist-grade/.

Cutscenes

Cutscenes are sequences that occur between periods of gameplay that give a player a break between levels or narrative sequences. They are usually short and often highlight the narrative threads of a game. By the end of the 1980s, the terms *cinematic* and *cutscene* were used to describe these short interludes.

Cutscenes are either rendered by the game's software in real time or pre-rendered video clips, usually with sound, and they help a game appear more cinematic. Today, they mainly rely on television and film production aesthetics and conventions and bear witness to greater cross-media hybridization between video games and these media.

As early as the 1980s, video games such as *Pac-Man* (1980) had short sequences that would be considered cutscenes today. The standardization of optical media, such as laserdiscs and CD-ROMs, with their great storage capacity (compared with earlier storage media), played an important role in the increasingly complicated process of making games and their cutscenes. Other animation techniques also generated movement on screen: slideshows made from still images (drawings or scanned pictures), as in *The Legend of Zelda: A Link to the Past* (1991); zooms and pans using still images, as in *Castle of Illusion Starring Mickey Mouse* (1990); or even short animated sequences rendered by the game engine itself. Along with graphics and processing enhancements, these breakthroughs allowed for better visuals and definitively established the cutscene in the gaming landscape. Cutscenes became a staple of the gaming paradigm, a guide to when to play and when to watch, and eventually a daring attempt to compete, at least narratively speaking, with the movie industry itself.

Thus, the cutscene briefly switches the player's attitude from an active one to a more passive spectator mode for the duration of the scene. These game moments heighten awareness of the player-game relationship status because the user is alternately a player and a spectator—and in some cases both simultaneously.

TYPES OF CUTSCENES

There are four main types of cutscenes: those using live action, those using traditional hand-drawn animation, those using pre-rendered computer animation, and those using computer-generated imagery rendered in real time.

Live-action cutscenes use actual live actors who are filmed on a physical set or on a blue screen or green screen and are composited into other backgrounds. They were frequently used in the beginning of the 1990s, such as in *The 7th Guest* (1993), *Wing Commander III* (1994), and *Under a Killing Moon* (1994). The initial enthusiastic reception by press and public alike was the result of what was perceived as the spectacular technical breakthrough of full-motion video (FMV) displayed on a computer. However, this trend waned and had passed by 1998, except for the occasional use of video footage, as in *The Phantom Menace* (1999) and *Lord of the Rings* game adaptations. Finally, it appeared as parody in the 2000s, as in *Skate* (2007) or *Command & Conquer: Red Alert 3* (2008).

Cutscenes using traditional hand-drawn animation began in such games as *Dragon's Lair* (1983) and are largely the result of Japan's production and impact on gaming culture, borrowing heavily from the 1970s manga (comic book) explosion. Since the 1990s, video game companies have usually hired traditional animation studios to create animated cutscenes, especially in the Japanese role-playing game (J-RPG) genre.

Cutscenes using pre-rendered computer-generated imagery (CGI) often use the same programs as the movie industry. Pre-rendered CGI cutscenes originated in the early 1990s in games such as *Dune* (1991), *Final Fantasy VII* (1997), and *Heart of Darkness* (1998). These clips were smoother and had better resolution and lighting than the real-time imagery produced by the actual game engines. Such graphics have given way to a race toward photo-realism—more details, more polygons, more visual accuracy, and even optical artifacts, as if the scene was shot by an actual film camera—but at the same time rendering camera moves that would not be possible with a physical camera. In all these cases, cutscenes were pre-rendered compressed video files that were played by the software.

When cutscenes are generated with real-time rendering, the game engine is animating the scene the same way graphics are animated during gameplay. This approach guarantees visual cohesion between gameplay and the cutscenes because both are generated by the same program. Moreover, this allows player interaction: in some cases, the player can pan the camera, slow its course, or even control the character. In *The Legend of Zelda: The Wind Waker* (2002), the introduction sequence greets the player each time with a different number of clouds or wave motions. In *Ico* (2001), Fumeto Ueda and his team used an ingenious scaling effect; the game is displayed within a larger invisible frame, allowing the player to use the right analog stick to zoom and pan with a virtual camera during the game and the engine-rendered cutscenes alike. This gives the player an original experience each time, whether the player takes part or just watches the unfolding story.

Hollywood blockbuster aesthetics strongly influence the design of these cutscenes, with their furious forward-motion movement, explosions by the score, speed, acceleration, slow motion, infinite framing possibilities, and the use of bombastic full orchestral music. The real-time cutscenes sometimes show off with impossible camera angles, as if they need to prove the processing system's firepower and mastery of such smoothly rendered images. Most of the time, the editing seems to be unmotivated by any deeper meaning or aesthetic ambition.

THE KEY ROLES OF CUTSCENES

Depending on their position in the continuity of the game experience, cutscenes can play different roles. Some occur directly at launch, after the power button has been pressed; these openings have been used frequently since the 1990s. Used mainly by adventure games and narrative-bound games at first, they found their way into sports games, real-time strategy games, and puzzle games as well.

Cutscenes set up a *horizon of expectations*, unveiling parts of settings, levels, characters, and situations (such as racing, fighting, or exploring). These opening sequences are also sometimes technical demos, showing off the programmers' virtuosity and using every bit of available power from players' machines. They are used as benchmarks, proving a platform's abilities, and are thus often used by studios and publishers in their communication and marketing campaigns.

When the player has to actually start a game to trigger an introduction movie, the cutscenes then play an introductory role, presenting the game world, characters, and story to the player. They often set an initial goal: a place to reach, an item to find, or a foe to vanquish. In addition to spectacle, they are more than mere demos, as they include narrative and gameplay elements.

Throughout the game itself, when the player has completed a level or achieved a certain goal, a cutscene comes as a reward for the player's skill and persistence. In more story-driven games, the cutscene participates in the unfolding story, summing up what has happened and presenting challenges, places, characters, or enemies. In sports games, cutscenes mostly serve as replays of the events in which the player has taken part. Designed to imitate television coverage, some cutscenes generated after a touchdown in a football game allow the action to be scrutinized from multiple camera angles.

Finally, some cutscenes act as closure sequences, either when "Game Over" has hit the screen after some failed attempt or when the last level of the game has been successfully completed. It is often an epilogue to the story, sometimes with rolling credits, imitating movie endings.

After fifty years of commercial video games, some may find it surprising that video games seek to reproduce an old-fashioned spectator relationship between the player and the game, taken from movies and television. The cutscene, as a semiotic marker, provides pacing, gives breaks between frenetic sessions, and allows moments of idleness in a world where interactivity is the main attraction. Cutscenes allow players to find some balance between active and passive reception and, by alternating between these modes, emphasize the presence of interactive stimuli within the more traditional pleasure of watching a story unfold.

Alexis Blanchet

See also: CD-ROM-Based Games

Further Reading

Bitanti, Matteo, ed. *Schermi Interattivi: Il Cinema nei Videogiochi*. Rome, Italy: Meltemi Editore, Coll. Melusine, 2008.

Burnham, Van, ed. *Supercade: A Visual History of the Videogame Age, 1971–1984*. Cambridge, MA: MIT Press, 2001.

King, Geoff, and Tanya Krzywinska, eds. *ScreenPlay: Cinema/Videogames/Interfaces*. London: Wallflower Press, 2002.

Mpondo-Dicka, Patrick. “Les Scènes Cinématiques dans les Jeux Video.” In *Le Game Design de Jeux Vidéo, Approches de l’Expression Vidéoludique*, edited by Sébastien Genvo, 209–236. Paris, France: L’Harmattan, Coll., “Communication et Civilisation,” 2006.

CVC GameLine Master Module

Control Video Corporation (CVC) was founded in 1983 by cable television pioneer William von Meister, also the founder of the largest computer network (phone-in data service) of the time, known as the Source. Von Meister had created an innovative modem transmission technology that he planned to use to provide music to cable companies through a service to be called the Home Music Store. When cable providers abandoned the project as a result of legal woes by opposing music retailers, von Meister founded CVC to provide video game content using his revolutionary delivery tool instead.

The end product was an oversized silver cartridge that plugged into the Atari VCS 2600 unit and was referred to as the Master Module. It contained 8 K of RAM on-board memory and included an internal 1200 baud modem that utilized a phone jack mounted on the side that allowed it to be connected to a telephone or telephone line. When activated, the GameLine Master Module would automatically dial the toll-free number to GameLine’s mainframe computer in Vienna, Virginia. For optimum compatibility, it was capable of either pulse or tone dialing.

Upon first use, the user would be required to set up an account, register a credit card number for billing, and pay a onetime registration fee of $15. Once connected, the equipment was sophisticated enough to remember the appropriate settings for ease of use in the future. In return, the member would receive a personal identification number used to log into the central CVC computer.

Each title available had its own ID number, and this three-digit ID number could be entered into the software for access to a particular game title within the library. Although the service featured only seventy-six games in rotation, it had the potential to provide service for up to one thousand games during any period of time.

For $1, GameLine users could download any game from the available library, which would be retained within the cartridge until the user turned off the Atari console or downloaded another game. Each game could be played five to ten times to ensure sufficient play value, with the actual figure being determined by the manufacturer. When the player’s credit expired, the unit would thank the player for playing and then the game would cease to operate. One perk of registering with GameLine was that a member was granted unlimited play on his or her birthday.

If the player scored high on a game title that had an ongoing contest, the player could enter the contest for a small processing fee. GameLine sponsored two competitions each month, beginning with *Demon Attack* (1982) and *CakeWalk* (1983). Prizes such as a GameLine jacket and other valuables were awarded by geographic region and were also planned to go national. Other prizes mentioned were free gameplays on the GameLine service, college scholarships, a sports car, and the ultimate World Video Game Championship award of $100,000 in gold.

The complete GameLine packet included the Master Module, a telephone cord, a duplex T-adapter, the sign-up agreement paperwork, a membership card, a poster, and a binder that housed rule summaries for games available on the service and included the premier issue of *Gameliner Magazine*.

Gameliner Magazine listed all the game titles available for play on the GameLine service and also featured gameplaying suggestions, questions and answers, and developer interviews, which included Imagic's Dennis Koble, the programmer of *Atlantis* (1982), and CommaVid's Irwin Gaines, the designer of *Mines of Minos* (1982) and *Cakewalk* (1983). *Gameliner* only lasted two regular issues before being reduced to a single instruction update and then ceasing publication altogether.

Originally, CVC promised several services beyond simple gaming: BankLine (for online banking), InfoLine (for an assortment of information, such as classified advertising, flight schedules, horoscopes, and more), MailLine (for electronic mail), NewsLine (an electronic newspaper with news headlines and weather reports), OpinionLine (an open forum for users to share their own thoughts), SportsLine (for game scores and statistics), and StockLine (for obtaining stock quotes, commodity pricing, and portfolios).

Atari, the maker of the VCS, did not allow its games to be played via the GameLine service. The majority of the larger third-party publishers, such as Activision, Coleco, Mattel, Parker Brothers, and SEGA, also failed to accept GameLine's terms of use. As a result, some of the biggest hits of the console never appeared on the service.

Only one of the major developers, Imagic, participated. Consequentially, only smaller game makers such as 20th Century Fox, Apollo, CommaVid, Data Age, Serius-Fox, Spectravision, Telesys, Tigervision, U.S. Games, and Vidtec had games included in the library. After the great video game industry crash of 1983, most of these publishers folded, leaving GameLine with a minimal amount of content and negatively affecting the company, eventually contributing to its demise.

The GameLine service did have one exclusive game title. Steve Beck programmed a game titled *Save the Whales* (1984) that was originally intended to be sold at retail with proceeds to benefit Greenpeace. Although the game was never released commercially, the game was playable through CVC's service.

Through a series of reorganizations, licensing steps, joint ventures, and partnerships with such parties as Quantum, Play-Net, Bell South, Commodore, Apple, and Tandy, CVC eventually evolved into the powerhouse internet service and media company known today as America Online (AOL).

CVC's GameLine is historically important because it marked the second time (following Mattel's PlayCable service in 1981) that video games could be downloaded through a telephone line. The June 1983 issue of *Electronic Games*

Magazine featured the Master Module and GameLine service and stated that it was "the greatest thing to happen to video games since the joystick."

Michael Thomasson

See also: Online Games

Further Reading

Burns, Deborah. "Dial-A-Game." *Antic* 2, no. 4 (July 1983): 82.

Herman, Leonard. *Phoenix IV: The History of the Videogame Industry*. Springfield, NJ: Rolenta Press, 2017.

Santulli, Joe. *Digital Press Collector's Guide*. Clifton, NJ: Digital Press, 2002.

Cyan Worlds

Cyan Worlds (also known as Cyan Inc. and Cyan Productions) is a developer based out of Mead, Washington. It created the adventure game *Myst* (1993), which held the title of best-selling computer game of all time for almost a decade and was the first of a five-game series of *Myst* games. In the 1990s, it was one of the most important independent development studios, but the failure of *Uru: Ages beyond Myst* (2003), an online game set in the same world as *Myst*, threw the company on much harder times.

Cyan was founded by brothers Rand and Robyn Miller. While working as a programmer at a bank in Texas, Rand sent the idea for a computer game to his artistic younger brother, who was a student at the University of Washington. Robyn, who was interested in illustration and music and had never worked on software before, nevertheless produced the artwork for the game and changed the design. The result was the 1987 release *The Manhole,* which went on to be the first entertainment software published on the new medium of the CD-ROM. The success of the game encouraged them to create a business, which they located in Mead, just outside Spokane, Washington, where their parents lived.

The next two titles, *Cosmic Osmo and the World beyond Mackerel* (1989) and *Spelunx and the Caves of Mr. Seudo* (1991), were also moderate successes. All three games had the same kind of style: they were open-ended environments with a simple mouse-driven point-and-click interface. None of the games prescribed directions for players or had anything like win-or-lose conditions.

Cyan's next project, *Myst*, retained this open-ended exploration but added in a narrative and puzzles that were closer to those of classic adventure games than the activities in the company's first three titles. Published by Brøderbund in September 1993, the production took longer than anticipated and was overbudget at a cost of $650,000. However, *Myst* garnered excellent reviews and won several Software Publishers Association awards in March 1994. Within several months of the release, the game became Brøderbund's best-selling title and was at the top of the sales charts by the end of 1994. It would remain the best-selling computer game of all time until it was unseated by *The Sims* (2000) in 2002.

Shortly after the completion of *Myst*, Cyan embarked on the creation of its sequel, the game that would eventually be called *Riven* (1997), a production considerably more ambitious than *Myst*, with a budget that eventually totaled $10 million. The company brought in Richard Vander Wende, an accomplished expert of special effects in film, to work on the game. Cyan eventually delivered the game almost a year later than it originally intended, releasing it in October 1997. Nevertheless, *Riven* proved to be, like its predecessor, a huge critical and commercial success. Despite its late release, it was the best-selling game of 1997. Cyan claims today that *Myst* and *Riven* combined have sold over twelve million units.

The years after 2000 were not as successful for Cyan Worlds. Robyn Miller and Richard Vander Wende left the company at the conclusion of *Riven*. Aside from *realMyst* (2000), a three-dimensional update of the original (which had used pre-rendered still images), Cyan stopped producing sequels of the game, licensing the right to Presto Studios (*Myst III: Exile*, 2001) and Ubisoft (*Myst IV: Revelation*, 2004). Cyan's next project, *Uru: Ages beyond Myst*, released in November 2003, was supposed to be a massively multiplayer online game, but low subscriber interest led Ubisoft to cancel the online component of the game in February 2004. However, beta testers kept the game alive on private servers with binaries provided by Cyan; this unofficial game became known as *Until Uru*. Cyan developed *Myst V: End of Ages* as the final single-player installment of the series and released it in September 2005.

Because it had no more projects, Cyan laid off almost all its staff until online game provider GameTap stepped in to finance continued development of the previously canceled online project. In January 2007, *Myst Online: Uru Live* was opened to the public, but in February 2008, GameTap announced the game was closing due to insufficient subscriber interest. After spending the summer working on the game, the lack of funding forced Cyan to give up on it, and in November 2008, they took the unusual step of announcing they would release the source code for the game, allowing the community to do what they wanted with it. This process took some time due to funding challenges. It reopened the game in February 2010 and then released the client engine and developer tools as open source in April 2011, after which the community continued to develop the game.

The studio continued to release ports of their older games for mobile platforms. In 2016, however, the studio released its first new title in many years, another puzzle adventure game called *Obduction*, which received moderately positive critical reception. Although not set in the *Myst* universe, it shared many of its gameplay characteristics. In 2018, the studio announced it was working on another project called *Firmament*, which it described as a "steampunk adventure" set in four realms.

The games of Cyan World all share certain characteristics. They are all nonviolent, which the Miller brothers attribute to their evangelical Christian faith; the games emphasize exploration of virtual spaces; they feature very simple, transparent interfaces; they are often critically acclaimed for their artwork and music; and they eschew many standard features of games. This last characteristic is a major point of contention: some critics argue, for a variety of reasons, that *Myst* can hardly be called a game and should be classified more generally as interactive entertainment. The Millers themselves have said in an interview that they view their most popular games as “immersive environments” more than games.

Regardless, *Myst* had a major impact on gaming culture and the games industry, in the 1990s at least. The Millers were celebrities of the games industry in the late 1990s. Their games helped encourage broad consumer adoption of CD-ROM drives and encouraged the industry to develop impressive three-dimensional graphics. Finally, Cyan games also helped diversify the adventure game genre.

Kevin Schut

See also: CD-ROM-Based Games

Further Reading

Carroll, Jon. “(D)Riven.” *Wired*, September 1997. Available at http://www.wired.com/wired/archive/5.09/riven.html.

Handy, Alex. “*Myst* Will Persist: How *Uru* Got Its Groove Back.” Gamasutra, June 29, 2006. Available at http://www.gamasutra.com/view/feature/2743/myst_will_persist_how_uru_got_its_.php.

Olivetti, Justin. “The Game Archaeologist: Myst Online.” Massively Overpowered, June 9, 2018. Available at https://massivelyop.com/2018/06/09/the-game-archaeologist-myst-online/.

Czech Republic

Today, the Czech Republic is home to studios producing acclaimed titles such as *Beat Saber* (2018), *Kingdom Come: Deliverance* (2018), and the *Samorost* and *Euro/American Truck Simulator* series. But the country has hosted a vibrant gaming and game development culture since the 1980s, and its history exemplifies the changing political and economic fortunes of the Central and Eastern European region.

Until 1989, today’s Czech Republic constituted the Western part of the Czechoslovak Socialist Republic, a two-nation federation that was a satellite country of the Soviet Union and ruled by an oppressive state socialist regime. The so-called Iron Curtain severely curtailed the movement of people, goods, and ideas between the West and the East. Due to Western export embargoes, lack of hard currency reserves, and an inefficient centrally planned economy, gaming hardware was scarce in Czechoslovakia. An active community of computing enthusiasts nevertheless did get hold of Western home computers, mostly by importing them individually or buying them on the black market. Thanks to its cheapness and versatility, the British Sinclair ZX Spectrum became the country’s most widespread 8-bit platform, bringing along a considerable influence of British games. Thanks to institutional support for computing education, local fans formed a wide network of computer clubs, mostly affiliated with paramilitary and youth organizations. These clubs became important sites where people tinkered with hardware as well as wrote, developed, and played games. As copyright for software was not enforced at the time, fans freely exchanged and distributed copies of both foreign and domestic titles (Švelch 2018).

Despite there being no software market before 1989, local authors, motivated by peer recognition as well as the desire for self-expression, produced over three hundred amateur titles in the 1980s. While some mimicked Western productions, others carved their own niches. As local players struggled while playing English-language titles, Czech-language text adventure games (also called *textovky*) became especially popular. One of the foundational titles was *Indiana Jones and the Temple of Doom* (1985) by the teenage hobbyist František Fuka. This game serves as a good example of the hybrid nature of the Czech game culture. It was written in Czech for the local audience but starred a hero of Western popular culture and utilized the design templates found in Western adventure games. Other notable local trends were *hacking games*, in which the player solved puzzles to break into fictional computer networks, or *hyperlocal games* that take place in the author's home, town, or school. In 1988–89, local activists made several *protest games*, such as *The Adventures of Indiana Jones on Wenceslas Square on January 16, 1989* (1989), a text adventure in which Indy had to avoid and defeat riot police during an antiregime demonstration. Efforts like this rank among the earliest documented activist digital games worldwide (Švelch 2018).

After the Velvet Revolution of 1989, private enterprise was legalized, and the country became a part of the global market. Although copyright for software was introduced in 1990, informal distribution continued to thrive during the following decade, in part because legal imports were sold for Western prices, which were too high for the post-Soviet market. Throughout the 1990s, the IBM PC became the number one gaming platform in the country due to the late arrival of console distributors and the convenience of the informal distribution of PC games. Despite the dissolution of the Czechoslovak federation in 1993, Czech and Slovak gaming cultures and industries remain tightly interconnected thanks to student and labor mobility. Since the 1990s, the Czech gaming culture has also become increasingly globalized, with patterns of use converging with worldwide trends. However, many local fans rely on gaming news and commentary from domestic rather than international sources (Šisler, Švelch, and Šlerka 2017).

Local game developers, including some alumni of the 1980s computer clubs, initially addressed the local audience. Taking advantage of the language barrier, some published point-'n'-click adventures in Czech, such as Pterodon Software's *The Secret of Donkey Island* (1994) (a parody of *The Secret of Monkey Island* [1990]), or the *Polda* series of cop comedy adventure games (Zima Software, 1998–2014), which featured voice acting by local actors. As development costs were rising during the 2000s as a result of technological progress and industry consolidation in the West, domestic developers started looking for ways into the global market (Bach 2012). The initial successes included titles such as Bohemia Interactive's military tactical simulation *Operation Flashpoint: Cold War Crisis* (2001) and Illusion Softworks' *Mafia* (2002) action-adventure game. Released through Western publishers, both games secured strong sales and international recognition and started respective franchises. However, the Czech game industry suffered from a lack of investors, making it difficult to establish strong domestic players on the market. Some studios were hired for outsourcing work, while Illusion Softworks was purchased by 2K Games. Warhorse Studios, the company behind the medieval role-playing game (RPG) *Kingdom Come: Deliverance* (2018), successfully sidestepped this obstacle by supplementing investment funds with crowdfunding.

In 2017, the Czech Republic was home to over forty companies producing over thirty titles annually (Kopecký 2018). Contemporary Czech production is diverse in both scale and genre. It ranges from massive projects such as *Kingdom Come: Deliverance* and complex military titles such as Bohemia Interactive's *ArmA* (2006–present) to successful midrange games such as SCS Software's *Euro/American Truck Simulator* series (2008–present) and indie titles such as Wube Software's *Factorio* (2019) or Keen Software House's *Space Engineers* (2019). Much of the local production builds on a detail-oriented tinkerer approach to game design inherited from the culture of the 1980s computer clubs. Other titles borrow from other arts traditions. Works by Amanita Design, such as the *Samorost* series (2003–16) or *Chuchel* (2018), draw inspiration from Czechoslovak animated film.

Despite its numerous successes, the Czech game industry seems to lack a singular blockbuster like the Polish *Witcher* series, which provided an enormous boost to the Polish game industry. There is, however, one game that might yet play a similar role in the Czech Republic: Beat Games' *Beat Saber* (2019), a virtual reality (VR) rhythm game that resulted from a collaboration between a Czech musician and a group of Slovak developers based in Prague that now ranks among the top-selling VR games. The question remains how many of its players are aware of its country (or countries) of origin.

Jaroslav Švelch

See also: Europe (Central and Eastern)

Further Reading

Bach, Martin. "Historie českých a slovenských her a týmů." In *Game Industry 2*, 230–240. Praha, Czech Republic: D.A.M.O., 2012.

Kopecký, Lubor. *český Herní Průmysl/Czech Video Game Industry 2018*. Praha, Czech Republic: Creative Europe Desk MEDIA, 2018. Available at http://www.mediadeskcz.eu/publication/?path = publikace%2Fherni-prumysl-cr-video-game-industry-cz-2016-ele.pdf&categoryId = 5&do = download.

Šisler, Vít, Jaroslav Švelch, and Josef Šlerka. "Video Games and the Asymmetry of Global Cultural Flows: The Game Industry and Game Culture in Iran and the Czech Republic." *International Journal of Communication* 11 (2017): 3857–3879.

Švelch, Jaroslav. *Gaming the Iron Curtain: How Teenagers and Amateurs in Communist Czechoslovakia Claimed the Medium of Computer Games*. Cambridge, MA: MIT Press, 2018.

D

Dance Dance Revolution (DDR)

Dance Dance Revolution (1998), often referred to by its acronym *DDR,* is the first of a series of rhythm and dance games produced by Konami. The game was released in Japan in 1998 as an arcade game and was followed by a wider release across North America, Europe, and Asia in 1999 for a range of home consoles, including the Sony PlayStation, the Microsoft Xbox, and the Nintendo Wii. Since 1998, Konami has released more than fifty versions of the game worldwide across consoles. The popularity of *Dance Dance Revolution* has spawned many imitation dance games, but none have attained the same level of success.

Gameplay requires a peripheral dance pad controller for both home and arcade versions. The dance pad has four colored directional arrows (front, back, left, right) as well as the necessary controls to navigate the game's user interface (such as "select" and "start"). Some versions allow the player to select an avatar that dances on the screen, while other versions have different avatars that dance to different songs. After selecting a song, the player must time his or her steps on the arrows of the dance pad with those scrolling from the bottom of the screen upward toward a set of stationary arrows. Success is based on how accurately players time their steps on the corresponding arrows as the scrolling arrows overlay the stationary ones on the screen. The arrow patterns resemble dance moves that are timed to the rhythm of the song.

As the difficulty level increases, the arrows scroll across the screen more quickly, challenging the player to keep up with the increasing speed. Each step is rated by a series of voice-over comments, such as "Boo," "Good," and "Perfect," which determines the player's overall score. As players successfully complete songs, more songs are unlocked, often increasing in difficulty. Different versions of the game have different rewards for successful completion of songs and levels, such as unlocking access to special battles, more songs to play, or new avatars.

Both arcade and home console versions can be played as a single-player game or competitively against other players. Several home versions boast online multiplayer options as well. *Dance Dance Revolution* is also played competitively internationally. There are two types of organized competitions around the world that are judged on either mastery of the gameplay or freestyle dance, in which players must master the step sequencing while performing creative dance moves. *Dance Dance Revolution* has a large global fan base with active online communities that are dedicated to offering players tips and techniques, events, machine locations, player statistics, and player videos.

Dance Dance Revolution has often been credited for popularizing Asian pop music in North America by producing music in-house for the game (with the exception of Disney's Family Channel edition). Most versions also include a small portion of mainstream American hits. Original and remixed versions of the songs are often available online in various formats. Because *DDR* requires full body movement to play, it is often associated with *exergaming*, video game play that promotes physical exercise and has even been used in physical education classes across the United States.

KONAMI
DanceDance Revolution

The arcade game *Dance Dance Revolution* (*DDR*). (Alexander Podshivalov/Dreamstime.com)

Kelly Boudreau

See also: Health (Physical); Rhythm and Dance Games

Further Reading

Andrews, G. “Dance Dance Revolution: Taking Back Arcade Space.” In *Space, Time, Play Computer Games, Architecture and Urbanism: The Next Level*, edited by Friedrich von Borries, Steffen P. Walz, and Matthias Böttger, 20–21. Basel, Switzerland: Birkhäuser Verlag AG, 2007.

Bogost, Ian. “The Rhetoric of Exergaming.” Paper presented at the Digital Arts and Culture Conference, Copenhagen, Denmark, December 2005. Available at http://bogost.com/writing/the_rhetoric_of_exergaming/?

Schiesel, S. “P.E. Classes Turn to Video Games That Work Legs.” *New York Times*, April 30, 2007. Available at http://www.nytimes.com/2007/04/30/health/30exer.html.

Smith, J. “I Can See Tomorrow in Your Dance: A Study of Dance Dance Revolution and Music Video Games.” *Journal of Popular Music Studies* 16, no. 1 (2004): 58–84.

Dance Games. *See* Rhythm and Dance Games

Data East USA v. Epyx

Data East released *Karate Champ*, a home version of its arcade fighting game, on October 12, 1985. Following this, Epyx licensed the game *International Karate* from UK developer System III Software and, on April 30, 1986, began North American distribution “of a Commodore-compatible version of International Karate under the name World Karate Championship” (*Data East USA Inc. vs. Epyx Inc.* 1988). On October 18 of that year, Data East filed a lawsuit against Epyx that alleged “infringement of copyright, trademark and trade dress, and requesting injunctive relief and impoundment of the infringing works” (Anderson 1989).

The district court ruled in Data East’s favor and issued an injunction prohibiting Epyx from selling *World Karate Championship* (1986). Epyx appealed the case, and the Ninth Circuit Court of Appeals overturned the decision. According to the circuit court’s verdict, “no direct evidence was developed that System III Software or anybody else copied any version of Data East’s product” (*Data East USA Inc. vs. Epyx Inc.* 1988). Therefore, the circuit court addressed the issue of whether Epyx or System III Software had stolen any ideas that were unique to Data East’s game.

In the decision, the judge found that the two games did share many similarities, such as the martial arts moves used, a timer, and a referee. However, the court found that because all of these came from actual karate competitions rather than originating with Data East, they were “not protectable” (*Data East USA Inc. vs. Epyx Inc.* 1988). Because of this, the judge reversed the lower court’s decision, and Epyx was once again able to sell *World Karate Championship*.

The case would go on to be a "seminal case" in software look-and-feel cases because it set a legal precedent "that what is 'idea' and what is 'expression' is determined on a case-by-case basis with no assurance or certainty of outcome" and that "only the original portrayal of an idea will be protected, and not the general presentation of that idea" (Anderson 1989; Hayes 1995; Russo and Nafziger 1992). Additionally, Data East would go on to use the case as a standard for what constituted copyright infringement of video games when Capcom alleged Data East's *Fighter's History* (1993) was too similar to Capcom's *Street Fighter II* (1991) in the case *Capcom USA v. Data East*.

Bryan-Mitchell Young

See also: Capcom; Capcom USA v. Data East

Further Reading

Anderson, C. E. "A Promise of Conformity in the Area of 'Look and Feel'?" *Santa Clara High Technology Law Journal* 5, no. 2 (1989): 547–557.

Data East USA Inc. vs. Epyx Inc., 862 Federal Reporter, Second Series 204 (United States Court of Appeals, Ninth Circuit 1988). Available at https://openjurist.org/862/f2d/204/data-east-usa-inc-v-epyx-inc.

Hayes, D. "A Comprehensive Current Analysis of Software Look and Feel' Protection—Part I." *Computer Law & Security Review* 11, no. 6 (1995): 304–317. Available at https://doi.org/10.1016/S0267-3649(00)80075-8.

Russo, J., and J. Nafziger. "Software Look and Feel Protection in the 1990s." *Hastings Communication & Entertainment Law Journal* 15 (1992): 571.

Dating Sims

The dating sim, short for dating-simulation game, or *ren'ai shimyurēshon gēmu* (roughly translated as "love simulation game") originated in Japan. These games are similar to the current form of visual novels in terms of gameplay and aesthetic but focus on dating or romance at their core and are considered a subgenre of simulation games. Depending on their target audience, they can be classified as *bishōjo gēmu*, for male audiences, or as *otome gēmu* for female consumers. Although both feature heterosexual monogamous relationships, male-oriented games may feature a harem ending, in which the relationship is with all the female characters at the same time. This ending is usually only obtainable after completing the game, meaning all the endings must be experienced first (Taylor 2007). Games featuring homosexual relationships are not unheard of but are rarer than their heteronormative counterparts.

The goal of a dating sim is to pursue and achieve romantic success with another character that is chosen from a pool of potential mates already predefined by the game. These can be available from the start or be unlocked through subsequent playthrough, and each romantic interest's storyline is generally referred to as a "route." Dating sims impose a certain time frame. In the allocated period, the player must successfully gain the affection of an eligible romantic partner and maintain the relationship through the course of the game. To do so, the player will have to plan accordingly by raising his or her avatar's parameters and scheduling and going on dates. It should be noted that, most of the time, stat building has no intrinsic value other than to garner the attention of certain characters. If the player drops underneath a certain level, a potential lover may cease to be available for dates. Therefore, players' choices mostly revolve around choosing actions and dialogue to meet their preferred romantic target's specific tastes, if they wish to succeed. A successful action is usually rewarded with an increase of affection of the character toward the player's avatar, often highlighted by immediate feedback, such as a visual or audio cue, or through the provided "love" meter accessible via the in-game menu. As the goal of such games is to form a romantic relationship, failing to do so will result in a bad ending. In contrast, a good ending will typically follow the romantic confession and show the happy couple.

There is also the visual novel equivalent of dating sims, which should be more aptly called a dating game because the "simulation" aspect of the game is greatly reduced, if not nonexistent. The "love" mechanic is fused with the narrative choices offered to the player, and each answer is allotted an affection value. Most of these games involve a complex, overarching plot in which all the romantic partners' storylines are embedded. Thus, many choices will not provide any kind of feedback, as they only affect the plot and not the romantic aspect. Nevertheless, it should be noted that the good ending for each character is usually tied to the resolution of the route's other objective.

Laurie-Mei Ross Dionne

See also: Visual Novels

Further Reading

Richards, Tina. "Tokimeki Memorial Girl's Side: Enacting Femininity to Avoid Dying Alone." *Transactions of the Digital Games Research Association* 2, no. 1 (2015): 101–127. Available at https://doi.org/10.26503/todigra.v2i1.43.

Song, Wen, and Jesse Fox. "Playing for Love in a Romantic Video Game: Avatar Identification, Parasocial Relationships, and Chinese Women's Romantic Beliefs." *Mass Communication and Society* 19 (2016): 297–315.

Taylor, Emily. "Dating-Simulation Games: Leisure and Gaming of Japanese Youth Culture." *Southeast Review of Asian Studies* 29 (2007): 129–208.

Death and Resurrection

Death is ubiquitous in computer games, especially avatar-based games. Players experience the death of their avatars when they are killed by non-player characters (NPCs) or by other players' avatars. Death, dying, killing, and committing suicide are activities present in many computer games. Death in computer games is not final, and resurrection is an experience made differently depending on the game. The functions of death in digital games can be described as part of the game design, an educational function, or a symbolic function.

The representation of death as part of a game's design can be observed in games that use Gothic aesthetics to create a specific atmosphere. We find graveyards, ghosts, zombies, other undead characters, and spooky atmospheres in some games or just some spooky areas in games supported by specific sounds and game music. The presence of death, not only by representations through the undead but as a biographical element, adds to the experience of a game as a world and its "worldness" (Klastrup 2008; Krzywinska 2008). A new aspect is introduced in games using figurines, such as the Amiibo, and the inclusion of death and resurrection rituals inside and outside of the game world (Barnes 2018). Representations of death and death rituals in games, especially in massively multiplayer online role-playing games (MMORPGs), can lead to conflicts between representations of death in game and repertoires related to death and death rituals from our life experience (Arnold et al. 2018; Tocci 2018).

The educational function of death in computer games is related to the player's skill at playing the game. As a beginner without much knowledge about the game, the player will die more often than a player who knows the game. Different games deal with the beginner's lack of skills in different ways. In platform games, the easier levels, where the games start, offer not only the chance to get used to the game's interface but also to collect items easily. Sometimes these items add another life to the number of lives a player has in the game, which means that the player can replay a sequence after dying according to the lives available. When no lives are left, the game is over. In computer games, the avatar's death has the function of optimizing our gameplay. Dying, then, is equal to failure, and the goal is to develop skills to avoid dying as much as possible (Curtis 2015; Leino 2012; Nohr 2012; Wenz 2014). In action games, such as first-person shooting games, dying has an impact on the rank of the player. The more avatars the player kills and the fewer times he or she dies, the higher the rank will be. In MMORPGs, dying has no major consequences for lower-level avatars. No experience points are lost, and no equipment is destroyed.

Another part of the educational function of dying in video games is the different punishment systems related to the avatar's death. Dying means a lack of control and leads to results that are annoying for the player. In arcade games, which are coin-operated machines, dying means the game is over, and another coin has to be inserted into the machine to start over again. Dying can have an impact on the player's rank, which is a nuisance when the player is ambitious and wants to reach a high rank. In console-based games and computer games, dying can have additional effects. The avatar's equipment may be lost or destroyed, which means the player has to pay in-game money to buy new equipment or repair whatever has been damaged. In some games, in-game money also has to be paid to recover from resurrection sickness by paying an NPC known as a *soul healer*. The higher the avatar's level, the more it costs for the soul healer. If the resurrection sickness is not removed by paying, it usually needs a few minutes to disappear. During these minutes, the avatar often moves slower and is more vulnerable to attacks.

Some games, such as *World of Warcraft* (*WoW* [2004]), require the player to run all the way back from the resurrection point as a ghost of the avatar's dead body. It is only by reuniting the ghost with the body that the player can continue playing. Instead of respawning and thereby going back to the resurrection point, which is the point where the player had saved the game, other players' avatars can resurrect a dead avatar either by using an item that can be bought in-game or by using a specific skill. The resurrection sickness does not disappear, but the avatar does not have to run all the way back to the place he or she died.

Some games do not allow for resurrection. The in-game death of the avatar is then permanent—this is called *permadeath*. Permadeath adds an element of failure connected with fear: the player fears losing the progress but also the special items in his or her possession.

Another activity related to death is the killing of other players' avatars or NPCs. Mastering the game means that one's own avatar survives, but the others are killed. "Killing" here means control and mastering the game. Because NPCs and other players' avatars resurrect, they are not "dead," but killing gives an advantage to one's own avatar in the game, such as winning points or items.

The symbolic function of death in computer games is related to the fact that computer games are simulations of our real-life experiences. The avatar is a representation of the player in the game world. At the start of a new game, the player is inexperienced and has to learn how to play and what to do in the game world. As a young child has to acquire knowledge about the rules and conventions of its world, so must the player in a game. Role-playing games (RPGs), in particular, incorporate biographical information into gameplay. Although the experience of death is a part of life, it is an experience we can only observe from the outside. Games offer us a safe way to identify with our avatar and experience its death and thereby reflect on the mortality of our being from a safe distance (on the afterlife, see Recher 2016).

While violent death is central in computer games, natural death is absent from most games because the player cannot win against it. A few exceptions are games that are explicitly about dying (e.g., *The Graveyard* [2009], *To the Moon* [2011], and *That Dragon, Cancer* [2016]). Games that focus on death and dying as simulations of death, and not simply as educational tools or design elements, bring death closer to the player either experienced as a simulation of one's own death or as the loss of a beloved one and a way to deal with bereavement (Ntelia 2015; Arnold et al. 2018).

The symbolic representation of death is used in forms of deludic play, a way to play that players use to deconstruct a games' rules (Kücklich 2004 and 2009). Instead of avoiding the avatar's death, the player seeks its death to try out all the possible ways the avatar can die in the game. As a result, game videos, known as *machinima*, are produced to show the many ways that an avatar can die in a game. Interestingly, these videos could be found under "game suicide videos," but the term "suicide" has instead been changed to "failure" on YouTube.

Karin Wenz

See also: Deludic Play; Failure

Further Reading

Arnold, Michael, Martin Gibbs, Tamara Kohn, James Meese, and Bjorn Nansen. *Death and Digital Media*. New York: Routledge, 2018.

Barnes, Rex. "Perilous and Peril-Less Gaming: Representations of Death with Nintendo's Wolf Link Amiibo." 2018. Available at https://www.researchgate.net/publication/329980792_Perilous_and_Peril-LessGamingRepresentationsof_Death_with_Nintendo_s_Wolf_Link_Amiibo.

Bauman, Zygmund. *Mortality, Immortality, and Other Life Strategies*. Stanford, CA: Stanford University Press, 1992.

Bernardi, Joe. "Death Is Not the End: Video Games Wrecked My Idea of Mortality." Hopes&Fears, 2015. Available at http://www.hopesandfears.com/hopes/culture/video-games/213589-dying-in-video-games.

Curtis, Stephen. "To Fatality and Beyond: The Deathsetics of Failure in Videogames." *The Luminary* 6 (2015). Available at https://www.lancaster.ac.uk/luminary/issue6/index.htm.

Fingarette, Herbert. *Death: Philosophical Soundings*. Chicago: Open Court, 1996.

Gennep, Arnold van. *The Rites of Passage*. Chicago: University of Chicago Press, 1969.

Kearl, Michael. *Endings: A Sociology of Death and Dying*. Oxford, UK: Oxford University Press, 1989.

Klastrup, Lisbeth. "What Makes World of Warcraft a World?: A Note on Death and Dying." In *Digital Culture, Play, and Identity: A World of Warcraft Reader*, edited by Hilde G. Corneliussen and Jill Walker Rettberg, 143–166. Cambridge, MA: MIT Press, 2008.

Krzywinska, Tanya. "World Creation and Lore: World of Warcraft as a Rich Text." In *Digital Culture, Play, and Identity: A World of Warcraft Reader*, edited by Hilde G. Corneliussen and Jill Walker Rettberg, 123–142. Cambridge, MA: MIT Press, 2008.

Kücklich, Julian. "Homo Deludens—Cheating as a Methodological Tool in Digital Games Research." *Convergence* 13, no. 4 (2004): 355–367.

Kücklich, Julian. "A Techno-Semiotik Approach to Cheating in Computer Games: Or How I Learned to Stop Worrying and Love the Machine." *Games and Culture* 4, no. 2 (2009): 158–169.

Leino, Olli Tapio. "Death Loop as a Feature." *Game Studies* 12, no. 2 (2012). Available at http://gamestudies.org/1202/articles/death_loop_as_a_feature.

Nohr, Rolf F. "Restart after Death: Self Optimizing, Normalism and Re-Entry in Computer Games." In *The Game Culture Reader*, edited by M. Ouellette and J. Thompson, 66–83. Newcastle, England: Cambridge Scholars Publishing, 2012.

Ntelia, Renata E. "Death in Digital Games: A Thanatological Approach." *Antea* 2, no. 2 (2015): 90–100.

Recher, Kevin. "Game Over . . . and Then?: The Representation of Death and the Afterlife in Videogames." *Disputatio Philosophica* 17, no. 1 (2016): 81–87.

Tocci, Jason. "You Are Dead. Continue?: Conflicts and Complements in Game Rules and Fiction." *Eludamos. Journal for Computer Game Culture* 2, no. 2 (2018): 187–201.

Wenz, Karin. "Death." In *The Routledge Companion to Video Game Studies*, edited by Mark J. P. Wolf and Bernard Perron, 310–316. New York: Routledge, 2014.

DECO Cassette System

The DECO cassette system was an arcade hardware platform introduced in 1980 by the Japanese video game company Data East Corporation (DECO). It was developed as an inexpensive solution to the problem posed by arcade games' limited market life. To maintain profitability, arcade operators had to regularly update the roster of games available in their establishments, pulling out games with waning popularity in favor of new offerings. The process was both costly and inconvenient, involving the replacement of the main circuit board at best or of the entire unit at worst. In contrast, the DECO cassette system allowed operators to change games in the cabinet on the software, rather than hardware, level. It is recognized as the first standardized system of this kind, predating other systems, such as Nintendo's PlayChoice-10, by six years and SNK's Neo•Geo MVS by ten years.

The DECO Cassette System was available in cocktail or upright cabinets that housed three printed circuit boards (CPU and display system, memory and audiosystem, and input controller) as well as a tape deck used to load games. The games themselves were distributed on proprietary audio cassettes. A complete game package consisted of a tape with the game program, a hardware security key (a copy protection measure), the operator's manual, an instruction sheet, the marquee, and promotional materials (such as display cards or mini posters). After placing the game cassette in the deck and plugging in the associated key module, the system was powered on, and upon successful verification of the security key, it loaded the program into memory. The loading process took approximately two to three minutes.

Theoretically, the innovative system was a convenient and inexpensive alternative to dedicated arcade cabinets. In practice, however, it was plagued by reliability problems because the magnetic tape wore out after just a few months of use. In addition, while DECO, for the most part, delivered on its promise of ten new games every year, many of them were mediocre and derivative. Approximately fifty games were released for the DECO Cassette System before it was discontinued in 1985. Notable titles include *BurgerTime* (1982) and *Bump 'n' Jump* (1982).

P. Konrad Budziszewski

See also: Arcade Games

Further Reading

"Data East DECO Cassette System Hardware." System 16: The Arcade Museum. Accessed September 11, 2020. Available at https://www.system16.com/hardware.php?id=913.

"Deco Cassette System." Everything2, February 25, 2002. Available at https://everything2.com/title/Deco + Cassette + System.

Defender

The arcade game *Defender* was developed by Eugene Jarvis and published by Williams in 1980. *Defender* is a notoriously difficult space shooting game. Its difficulty is present in all aspects of the game design, from the basic controls and the movement of its enemies to the way it punishes the player for failing to meet the game's core objective. *Defender* is at once a classic game in video game history, an evolutionary dead end, and the pinnacle of a specific type of design.

Among the earliest games to feature a scrolling world larger than the game screen, *Defender* asks the player to move a spaceship across a planet surface while protecting humans from alien spaceships trying to abduct them (abducted humans transform into dangerous mutants). The game is also characterized by a number of well-crafted graphics and sound effects.

According to conventional wisdom, a game should be easy to learn but difficult to master (Juul and Norton 2009). The obvious choice of controller for *Defender* would be a four-direction joystick that the player could use for moving his or her ship around the game world; instead, Jarvis chose to give players something much less intuitive: one stick that controls vertical movement, a button that thrusts the ship forward, and a button that reverses direction. Although conventional design wisdom would dictate that the player should be given a chance to make amends and return to the regular mode, *Defender* is also unusual in that if the player fails to protect the game's humans, the planet will explode; the player must then spend the rest of the game in an especially difficult hyperspace mode in which all aliens are mutants.

Defender is considered one of the classic arcade games, but it has arguably had limited influence on subsequent game design in either its bidirectional scrolling or in its core design value of an extreme challenge. The latter was partially dictated by the economic model of the arcade and the limited storage space available to game designers at the time. Technology would later allow game designers to create more variation in their game worlds, and home games removed the necessity of limiting the player's play time. Conversely, *Defender* is a game so difficult that it could not have come out even a few years earlier because it required a dedicated video game audience whose skills had been honed by earlier video games.

Jesper Juul

See also: Arcade Games

Further Reading

Camper, Brett. "Color-Cycled Space Fumes in the Pixel Particle Shockwave: The Technical Aesthetics of Defender and the Williams Arcade Platform, 1980–1982." In *Before the Crash: Early Video Game History*, edited by Mark J. P. Wolf, 168–188. Detroit, MI: Wayne State University Press, 2012.

Juul, Jesper, and Marleigh Norton. "Easy to Use and Incredibly Difficult: On the Mythical Border between Interface and Gameplay." In *Proceedings of the 4th International Conference on Foundations of Digital Games*, 107–112. Orlando, FL: ACM, 2009. Available at http://portal.acm.org/citation.cfm?id=1536539.

Deludic Play

The term *deludic play* is derived from the Latin *deludo* ("to delude" or "to cheat") and describes forms of play that deviate from the norms established in a given game space. These norms are not primarily determined by the rules (or the code) of the game but derive from the interplay between the expectations of game designers, genre conventions, game rules, and player interventions.

Forms of deludic play thus include different forms of cheating, such as walkthroughs, FAQs, cheat codes, and hacking (Consalvo 2007; Kücklich 2008), as well as game modifications (Kücklich 2005), emergent gameplay (Juul 2005), creative player actions (Wright, Boria, and Breidenbach 2002), player protests in virtual worlds (Thomas 2005), artistic interventions such as Anne Marie Schleiner's *Velvet Strike* (2002), metagaming (Bainbridge and Bainbridge 2007), deterritorialized play (Pearce and Pearce 2009), powergaming and grief play (Taylor 2006), and gold farming (Dibbell 2007).

Insofar as certain forms of deludic play are politically motivated, the term shares similarities with Alexander Galloway's (2006) concept of *countergaming* as well as Nick Dyer-Witheford and Greg de Peuter's (2009) *counterplay*. Galloway's term is specific to artist-made game mods that disrupt narrative flow and foreground the gaming apparatus. Counterplay is more inclusive and encompasses strategies of refusal against the "imperial" ideology of many video games.

Deludic play can occur both within and outside of games, but it always manifests itself as a critical yet playful engagement with games culture. Characteristically, it uses the means of games production, dissemination, and marketing to critique and challenge the commodification and ideologization of digital play.

Julian Raul Kücklich

See also: Game Modifications; Glitches

Further Reading

Bainbridge, W. A., and W. S. Bainbridge. "Creative Uses of Software Errors—Glitches and Cheats." *Social Science Computer Review* 25 (2007): 61–77.

Consalvo, Mia. *Cheating: Gaining Advantage in Videogames*. Cambridge, MA: MIT Press, 2007.

Dibbell, Julian. "The Life of the Chinese Gold Farmer." *New York Times Magazine*, June 17, 2007. Available at https://www.nytimes.com/2007/06/17/magazine/17lootfarmers-t.html.

Dyer-Witheford, Nick, and Greg de Peuter. *Games of Empire: Global Capitalism and Video Games*. Minneapolis: University of Minnesota Press, 2009.

Galloway, Alexander. *Gaming: Essays on Algorithmic Culture*. Minneapolis: University of Minnesota Press, 2006.

Juul, Jesper. *Half-Real: Video Games between Real Rules and Fictional Worlds*. Cambridge, MA: MIT Press, 2005.

Kücklich, Julian. "Forbidden Pleasures: Cheating in Computer Games." In *The Pleasures of Computer Gaming: Essays on Cultural History, Theory and Aesthetics*, edited by Melanie Swalwell and Jason Wilson, 52–71. Jefferson, NC: McFarland, 2008.

Kücklich, Julian. "Precarious Playbour: Modders and the Digital Games Industry." *Fibreculture Journal* 3, no. 5 (2005). Available at http://journal.fibreculture.org/issue5/kucklich.html.

Pearce, Celia, and Artemesia Pearce. *Communities of Play: Emergent Cultures in Multiplayer Games and Virtual Worlds*. Cambridge, MA: MIT Press, 2009.

Schleiner, Anne-Marie. "*Velvet Strike*: Counter-Military Graffiti for *CS*." Opensorcery.net, 2002. Available at http://www.opensorcery.net/velvet-strike/about.html.

Taylor, T. L. *Play between Worlds: Exploring Online Game Culture*. Cambridge, MA: MIT Press, 2006.

Thomas, Douglas. "Before the Jump to Lightspeed: Negotiating Permanence and Change in *Star Wars Galaxies*." Paper presented at the Creative Gamers Symposium, University of Tampere, Tampere, Finland, January 11–12, 2005.

Wright, Talmadge, Eric Boria, and Paul Breidenbach. "Creative Player Actions in FPS Online Video Games: Playing Counter-Strike." *Game Studies* 2, no. 2 (2002). Available at http://gamestudies.org/0202/wright.

Demoscenes

A demoscene is an international, underground computer subculture, a network of creative minds who produce multimedia art, called *demos*. Demos are pieces of free software that show real-time rendered graphics and animations and usually play music that is synced to visuals. Unlike games, these demos are usually noninteractive. However sometimes there is some limited interactivity: for example, in the classic Commodore 64 demo called *Personal Lady* (Scoop, 1987), the viewer could type in the handle of the creator, which caused the girl's swimsuit to disappear. The demoscene is a typical European phenomenon, and it is also male dominated.

Similar to other self-organized subcultures, the members of a demoscene usually unite in small groups that produce demos for the joy of creation and also for artistic competition. Demoscene groups are often international. Demo making is teamwork, and each member, called a *scener*, provides the team with different skills. The most important members of the group are the programmer (coder), who writes the program code; the graphic artist, who creates the graphics; the musician, who writes the music; and sometimes also the 3-D modeler, who is responsible for the 3-D visuality. The duty of the programmers is to fit all the parts together to make it an executable program. There are also organizers who organize events and help the promotion of the groups. The demoscene members do not necessarily have to meet each other during this process, and sometimes they share their latest work through the internet.

Demos are often short clips, called *intros*. These provide coders the opportunity to prove their ability to squeeze impressive audiovisual material into 64 kilobytes, 4 kilobytes, or even 256 bytes of memory. Although most of the demos are now produced for Windows, basically any operating system is suitable for producing demos. There is a vibrant demoscene community centered around classic 8-bit and 16-bit computers, such as the Commodore 64 and Amiga, and there are demos for almost everything that includes a screen, from mobile phones to iPods to modern electronic typewriters.

Demoscene groups meet in demoparties, which are the most important events for competition and socialization. In the mid-1980s, demoparties were also copyparties, where the first so-called hot releases of cracked and trained games changed hands. However, illegal software copying later disappeared, and demoparties became professional events, sometimes even sponsored by branches of technical companies such as Mozilla Labs. A demoparty is usually a nonstop event held the whole weekend in large halls with tables, electricity, and a local area network (LAN) connected to the internet. Participants sometimes bring their own computers. The highlight of the party is the competition, the *demo compo*, which is usually held on Saturday night when the “sceners” present their work using a video projector and loudspeakers. There are various categories, and the audience vote for the winners.

Thus, the demoparties became the main driving force for the development of the demos. Although there are sometimes crossovers between demoparties and LAN parties, participants at demoparties spend more time socializing, for example, by making campfires outside. Also, in the late 1980s, when demoparties were not so frequent, disk magazines, also called *diskmags*, such as *Illegal* for the Commodore 64, were important forums for announcing news and for monitoring competitions between various demogroups.

The evolution of the demoscene culture started in the early 1980s and is strongly connected to “cracker” subculture. As computer games gained popularity, illegal copying and distributing of games became a widespread phenomenon. Software developers tried to protect their products with copy protections, which were quickly removed by crackers or cracker groups. These crackers tried to step out from anonymity by putting their “signature” or logo on the title screen where the name of the developer was, often supplemented or even substituted with a simple text indicating the year of the cracking and the pseudonym of the cracker (e.g., CRACKED 1984 BY ANTIRAM).

To gain more attention, rival crackers and cracker groups started to attach small sections of programs, called *intros*, *cracker intros*, or *cracktros*, before the actual software. These were plain texts or simple images with the logo of the cracker or some graphic sprites. However, around 1985–86, these cracktros started to evolve into a special multimedia art form. Cracker groups for the Commodore 64 computer, such as Dynamic Duo, 1001 Crew, Ikari, Fairlight, Hotline, Triad, and Eagle Soft (the latter one from the United States), looked for new ideas: scrollers, rasterbars, and music also appeared as a part of the intro. The group's fame was not only based on the number of the cracked games but also on the quality of the intro.

As intros developed, the logo of the group or some important message started to move sideways, or up and down, and the spectacle was further enhanced by applying rasterbars, or stripes, varying the color registers. In the messages, cracker groups also greeted each other with the *ranked ratings* (this was invented by the group Triad): names of groups followed each other in a ranked list. Cracktros and importer intros (the intros made by groups who imported the cracked game into a country) sometimes became more spectacular than the game itself. Thus, intros slowly started to disassemble from the cracked games, and the connection between cracking and the demoscene disappeared, allowing the latter to evolve into a unique art form.

In the years 1985–89, the Commodore 64 was the main platform for demo programs. While the first pure demos still resembled intros, new compression routines led to the development of more serious programs. These demos often took advantage of the undocumented side effects pertaining to the MOS-Technology VIC-20 chip, such as placing sprite scrollers on the border of the screen, using multiplexed sprites across vertical raster lines, or increasing the number or unique colors that could appear in an eight-by-eight or eight-by-four block on the screen. These programs slowly grew over the 64 kilobyte limit. The introduction of the overlaying technique led to a new genre called *megademo*, that is, a large, long-running demo in which demo parts were linked together with loader routines; while an effect was shown on the screen, the next part was already loading.

The Dutch groups 1001 Crew and the Judges were among the first Commodore 64–based demo groups, and two Swedish groups, Castor Cracking Group (CCG) and the Lords, were early ZX Spectrum demoscene groups. With the arrival of Commodore Amiga, more and more groups moved to the 16-bit scene. The period of 1989–93 can be characterized as the golden age of demoscene parties. One of the first parties was the Razor 1911/The Cartel/Abnormal Party, held in Stjordahl, Norway, in October 1988, where both Commodore 64 and Amiga groups competed. This party was later ruined by the arrival of some policemen. Although panic broke out and some of the sceners even jumped out of the window, according to gossip, the leading officer was also a Commodore 64 user, and because of that, for the exchange of some fresh games, he canceled the raid. The party was later covered in a two-page spread in one of Norway's largest newspapers, *Aftenposten Lordag*.

Scandinavia was the hotbed of demoscene activity due to their early computerization, social welfare, and educational system (and probably the cold weather as well). In Sweden, there was even a weekly TV show called *Bit för Bit* in 1989 that regularly showed clips from a number of demos each week, and people called in to vote for their favorites. Famous demogroups, such as Horizon and Rebels, sometimes participated in these competitions. Demoscene groups such as Anarchy, Equinox, Fairlight (also a cracking group), Tristar & Red Sector Incorporated (TRSI), Sanity, Genesis Project, Horizon, Rebels, and Crionics were at the peak of their operations around 1990.

Unlike in Western Europe, where demoscene groups emerged from cracking groups, in Eastern Europe, early groups mostly specialized in importing and swapping. One of the first Eastern European importer groups was the Hungarian FBI Crew, which was founded by Mr. Wax, Aster, and Imy in 1988. Mr. Wax soon became recognized internationally as an elite megaswapper, importer, and pen pal of hundreds. FBI Crew also produced demos, the most famous of which was *Sun for Fun* for the Commodore 64, released in 1990. Other early important groups from Hungary were Reds (founded by Martin, Vertex, and Zolee in 1988), Quality (whose key figures were H.I.C., TSS, and Dark Side), also founded in 1988, and Faces (founded in 1990 or 1991). The most famous and active Hungarian group was Chromance, which grew out from the FBI Crew in 1990. While Mr. Wax was still dealing with C64 material, another key figure of Chromance, Jean, moved to Amiga programs and soon became, with Mr. Wax, one of the most famous swappers/importers/coders in the Eastern European demoscene history. Jean also had a regular column on demoscenes in the magazine *Computer Mania* in 1991 and later in the magazine *Guru*. Chromance soon had international members as well, and they also edited a papermag called *Gridpoint Observer* in 1990 and a C64 diskmag called *Are We the Best*, which started in 1991 and had eight issues. Some other important Hungarian demoscene groups from this period were Triumwyrat and Faces.

In Hungary, in September 1991, one of the biggest copyparties and demoparties of the Eastern Bloc was held at Budapest Technical University, the C.C.C.C.P (Chromance & Cerberos & Computermania Copy Party), which had around five hundred attendees. There were some copyparties in the former Yugoslavia, such as the Transcom & Victory Copy Party in August 1990 in Subotica and the Headway and Faces Party in July 1993 in Szeged, Hungary.

Demoscene culture in Europe also involved other computers, including Atari ST groups such as TEX, Level 16, TNT-Crew, and ST-Connexion, which received international fame. However, these were much smaller communities.

While demoparties were the main meeting points for sceners, people communicated with each other and changed programs regularly by postal mail. The messages in demoprograms usually contained the address of the sceners, who could write letters and exchange programs this way. The swapping of disks containing the newest programs was an important activity, and there were people, called *swappers*, who specialized in copying and sending games all around the world, building up an enormous network. To reduce postal costs, Eastern European swappers applied various tricks. The most common was “waxing”: stamps were covered domestically with a thin layer of wax, which was later removed, together with the postal seal; that way, when it was sent back, the same stamp could be reused. Another technique was to cover the stamp with a transparent sticker that could also be removed later. In the early 1990s, the distribution slowly moved to dial-up modems and bulletin board systems (BBSs). However, this led to a new problem, long-distance phone bills, which was often solved with various creative techniques of hacking the telephone line.

PC-based demoscenes started around 1993. However, many of the groups, such as the influential Future Crew, were rooted in the Commodore scene. This was the period when copyparties became higher-profile professionally organized events, and the focus shifted into demo making and competitions. Not only was the copying of illegal material prohibited but also the use of alcohol. The biggest annual demoscene parties became the Party in Denmark (held from 1991 to 2002), Assembly in Finland, and the Gathering in Norway, with thousands of visitors. Other important European parties today are Revision (formerly Breakpoint), which takes place in Germany during Easter; Evoke in Cologne; and Bünzli in Switzerland. There is also a huge party in Hungary every year called Function. There are a few minor demoparties in the United States as well, including Pixeljam, Blockparty, and Pilgrimage.

The technical virtuosity required for demo programs also affected video games, influencing both the music and visual quality of games around the 1990s. This influence is conspicuous, for example, in the intros of numerous Amiga games in various graphical and technical approaches. In this way, demos played an important role not only in the distribution of games but also in their evolution. Numerous Northwest and Northern European game musicians and programmers started as sceners. Charles Deenen and Reyn Ouwehand (of the music group Maniacs of Noise), for example, were in the group Scoop Designs. Fredrik Liliegren and Olof Gustafsson, of the Swedish studio Digital Illusions, which produced the successful *Pinball Dreams* (1992), were originally members of the Amiga group the Silents. Manfred Trenz, the programmer and designer of some of the biggest Commodore 64 hits, such as *The Great Giana Sisters* (1987), *Katakis* (1988), and *Turrican* (1990), which pushed the limit of the graphics quality of C64, coded various demos. Finnish Remedy Entertainment, best known for the *Max Payne* games, was also formed by ex-Amiga, Atari ST, and PC demo groups, such as Scoopex, Aggression, and Future Crew. Jaakko Iisalo, the lead designer of *Angry Birds* (2009), was a member of the Croaker/Halcyon group, and the company Funcom also involved many sceners.

Although one of the greatest game designers of all time, Will Wright, was never involved in the demoscene himself, he admitted that for the inspiration for his game *Spore* (2008), he looked to the procedural programming methods of European demosceners who were able to fit an entire 3-D game in 64 K using mathematics to generate textures and music. The Finnish company Futuremark, responsible for the test program *3DMark*, also mainly consists of ex-demoscene members.

Tamás Beregi

See also: Czech Republic; Denmark; Hungary

Further Reading

"Interview with Mr. Wax." *Tehernapló*, February 13, 2014. Available at https://tehernaplo.blog.hu/tags/chromance.

Montfort, Nick. "Gamer vs. Scener, or, Scener Theory." Post Position, June 17, 2012. Available at http://nickm.com/post/2012/06/gamer-vs-scener-or-scener-theory/.

Polgár, Tamás. *Freax: The Brief History of the Demoscene*. Vol. 1. Winenden, Germany: CSW Verlag, 2005.

Reunanen, Markku. *Computer Demos—What Makes Them Tick?* Helsinki, Finland: Aalto University School of Science and Technology, 2010. Available at: http://

www.kameli.net/demoresearch2/reunanen-licthesis.pdf.

Reunanen, Markku. "How Those Crackers Became Us Demosceners." *WiderScreen* 1–2 (2014). Available at http://widerscreen.fi/numerot/2014-1-2/crackers-became-us-demosceners/.

Shor, Shirley, and Aviv Eyal. "DEMOing: A New Emerging Art Form or Just Another Digital Craft?" *Intelligent Agent* (2004). Available at http://intelligentagent.com/archive/IA4_1demosceneshoreval.pdf.

Tasajärvi, Lassi, ed. *Demoscene: The Art of Real-Time*. Helsinki, Finland: Even Lake Studios and www.katastro.fi., 2004.

Wasyak, Patrik. "'Illegal Guys': A History of Digital Subcultures in Europe during the 1980s." *Zeithistorische Forschungen/Studies in Contemporary History* 9, no. 2 (2012): 257–276. Available at https://zeithistorische-forschungen.de/site/40209282/default.aspx.

Denmark

Designer and poet Piet Hein and programmer Søren Lauesen created the first Danish computer game, *Nimbi*, in 1963, inspired by the game *Nim* (1940), and the first Danish video game console with black-and-white ball-and-paddle sport games was the Dava-Tronic Video Sport from Daells Varehus in 1977. In 1981, Peter Ole Frederiksen created *Kaptajn Kaper i Kattegat* (*Privateer*), a shooting and strategy game for home computers. These early attempts were isolated instances, but this seemed to change in 1986, when Keld Jensen established the Danish video game company Kele-Line. Kele-Line released *The Vikings* (1986) and three other video games before going bust the following year. Programmer Søren Grønbech and visual artist Torben Bakager Larsen had worked together on *The Vikings* and developed the hack-and-slash game *Sword of Sodan* (1988), selling more than fifty-five thousand copies. Another short-lived video game company was Parsec (1987–90), which released only four video games.

In 1989, the Danish television company TV2 introduced the first television video game, *OsWald*, in which a viewer controlled the polar bear OsWald via telephone, utilizing dual-tone multifrequency signaling. This led to the first Danish video game success a year later when TV2 launched *Skærmtrolden Hugo* (*Hugo the TV Troll*) (1990). The *Hugo* game show franchise aired in more than forty countries and sold over ten million video games. InterActiVision (later Interactive Vision) produced *Labyrinth* (1990), a television video game for the Danish television company Danmarks Radio, and such video games as *Search and Rescue* (1997), *Operation Air Assault* (2005), and *Franklin the Turtle* (2005). In 1991, the University of Copenhagen released the multiplayer text-based role-playing game (RPG) *DikuMUD*, and Aarhus University launched the single-player and multiplayer turn-based strategy game *Freeciv* (1996).

In the mid-1990s, children's video game franchises produced the games *Pixeline* (1994), *Magnus og Myggen* (*Skipper & Skeeto*) (1995), and the *Bellini* series (1997). Deadline Games, conversely, created artistic video games for adults, such as *Blackout* (1997) and the *Crosstown* series (1999). Later, Deadline Games went on to make *Total Overdose: A Gunslinger's Tale in Mexico* (2005) and *Watchmen: The End Is Nigh* (2009). Nevertheless, it was *Hitman: Codename 47* (2000) by IO Interactive that led to a big Danish video game success, selling more than fifteen million copies of the *Hitman* series. The award-winning video game music composer Jesper Kyd composed the music for *Hitman*. IO Interactive also made *Freedom Fighters* (2003) and *Kane & Lynch: Dead Men* (2007). Another important contribution to video game development was the Danish video game engine Unity, released by David Helgason, Joachim Ante, and Nicholas Francis in 2005.

In 2010, Arnt Jensen created the award-winning noir puzzle platform game *Limbo* (2010) followed by *Inside* (2016). Kiloo and SYBO Games codeveloped the mobile game *Subway Surfers* (2012), which in March 2018 became the first game to reach a billion downloads on Google Play Store. Funded through a Kickstarter campaign, the action-adventure game *A Hat in Time* (2017), by Jonas Kærlev, doubled its fund-raising goals within the first two days and ended up selling more than one million copies.

Lars Konzack

See also: Finland; Norway; Sweden

Further Reading

Konzack, Lars. "Scandinavia." In *Video Games around the World*, edited by Mark J. P. Wolf, 451–467. Cambridge, MA: MIT Press, 2015.

Design. *See* Game Design

Digital Games Research Association (DiGRA)

The Digital Games Research Association (DiGRA) is an association established in 2003 to bring together academics and professionals who work on digital games research and advance their interests. One of the key activities of the association has been the series of conferences it has organized, starting from Level Up in Utrecht, the Netherlands, in 2003, and then moving to North America with Changing Views in 2005, which took place in Vancouver, Canada. The third conference, Situated Play, was organized in Asia and took place in Tokyo, Japan. The series came back to Europe with Breaking New Ground, which was organized in Brunel, West London, in 2009. Since then, DiGRA world conferences have continued to rotate on an annual basis from continent to continent, and a series of "local" conferences have also been established, such as the DiGRA Nordic, DiGRA Australia, and Chinese DiGRA conferences.

With a history spanning just a couple decades, DiGRA is a rather young academic community, reflecting a new phase in the development of video game studies. The original ideas for DiGRA were born during a series of conferences that took place during the late 1990s and early 2000s, which all appeared to share a common cultural and artistic approach to video games. Particularly, Western Europe, the Nordic countries, and North America appeared as breeding grounds for new theoretically, culturally, socially, and artistically oriented game research at that time.

There existed several older associations already, such as the International Simulation and Gaming Association (ISAGA), as well as various associations studying play and related phenomena (e.g., The Association for the Study of Play (TASP) in the United States). The more technical aspects of computer games had also been researched and discussed for some time among computer scientists in associations such as the Association of Computing Machinery (ACM).

Whether they were right or not, the young generation of scholars who formed DiGRA felt their approach had an emphasis different from that of the older academic communities, giving DiGRA a slightly different mandate. The cultural context and character of video and computer games had greatly changed during the earlier years when games first began, and the range and complexity of games had increased as well as their technological and artistic sophistication. Also, the social and psychological questions surrounding gameplay had grown in significance, as games became increasingly pervasive elements in everyday lives and the participation in virtual game worlds started attracting populations in the millions. All this meant that the twenty-first-century games research addressed a sprawling popular cultural phenomenon, which presented new kinds of theoretical and practical demands to research and education.

Frans Mäyrä

See also: Video Game Studies

Further Reading

DiGRA website. Accessed September 11, 2020. Available at http://www.digra.org.

Digital Games Research Center (DIGAREC)

The Digital Games Research Center (DIGAREC) of the University of Potsdam is the first academic institution at a German university to study computer games on an interdisciplinary basis. It works in cooperation with numerous scholars from different universities and research establishments in the region of Brandenburg and Berlin, including institutes for Jewish studies, English and American studies, psychology, pedagogy, geography, digital culture, history, mathematics, media law, and media design.

The center was founded by media philosopher Dieter Mersch in December 2007 at the University of Potsdam's Department for Arts and Media supported by a research grant on the "Mediality of Computer Games" by the German Research Foundation (*Deutsche Forschungsgemeinschaft* [DFG]). The project focused on aesthetic and performative aspects of the medium as well as its structural and technical specificities and influences the research agenda of the center until today.

The center founded and operates an independent collection of more than ten thousand computer games for various platforms that are available to game researchers. The games are subject to the development of a classification system initiated by Stephan Günzel and Michael Liebe. The categories integrate results from video game studies with the aim of establishing a systematic foundation for the comparison of games beyond genres. In 2019, and together with Computer Games Museum (Computerspielemuseum) in Berlin, the Foundation for Digital Game Culture (Stiftung Digitale Spielekultur), the Entertainment Software Self-Regulation Body (USK), and the association of the German games industry, DIGAREC has finalized the first phase of founding the International Computer Games Collection (Internationale Computerspielesammlung, https://www.internationale-computerspielesammlung.de), which will contain more than fifty-eight thousand computer games.

DIGAREC is the regular host of international lectures, conferences, and workshops on interdisciplinary game studies. It has hosted international conferences such as the Philosophy of Computer Games (2008) and Logic and Structure of the Computer Game (2009). Its members are continuously involved in organizations of future iterations of the Philosophy of Computer Games conference. The center regularly hosts workshops on topics such as in-game photography, ludic boredom, serious games, and gamification. Supported by the Medienboard Berlin-Brandenburg, the DIGAREC Lectures take place in Potsdam, and past keynote speakers include Espen Aarseth, Lev Manovich, Frans Mäyrä, Katie Salen, Mark J. P. Wolf, and others. From 2017 on, the DIGAREC Lectures have been organized in collaboration with Nathanael Riemer and Manuela Pohl and are dedicated to the use of computer games in educational contexts. Proceedings, theses, and other research results are published in the *DIGAREC Series* at the Potsdam University Press in print as well as online following an open-access policy.

In Germany, in addition to the aforementioned institutions, DIGAREC collaborates with the Game Art festival A MAZE, the University of Applied Sciences Europe Campus Berlin, and the Brandenburg Center for Media Studies. International contacts are established with the School of Creative Media at the City University of Hong Kong, the Game Research Centre at the Jagiellonian University in Krakow, the Institute for Digital Games University of Malta, and the Center for Computer Game Research at the IT University of Copenhagen, where the first joint Ludotopia workshop on computer game spaces took place in 2010.

Stephan Günzel, Michael Liebe, and Sebastian Möring

See also: Germany

Further Reading

Günzel, Stephan, Michael Liebe, and Dieter Mersch, eds. *Conference Proceedings of the Philosophy of Computer Games*. Potsdam, Germany: Potsdam University Press, 2008.

Günzel, Stephan, Michael Liebe, and Dieter Mersch, eds. *DIGAREC Keynote-Lectures*. Potsdam, Germany: Potsdam University Press, 2011.

Günzel, Stephan, Michael Liebe, and Dieter Mersch, eds. *Logic and Structure of the Computer Game*. Potsdam, Germany: Potsdam University Press, 2010.

Dimensionality

Between abstraction and realism, video game history may be regarded as an interrogation of the very nature of space, balancing the relationship between dimensionality and the technology needed to produce it. From the simulation of 3-D environments in early games that were not truly three dimensional, to the complex juxtaposition of virtual and real spaces made possible by augmented reality (AR) today, dimensionality (the number and structure of dimensions within a game) has always been a strategic horizon for the design and enjoyment of interactive media. The connection, or lack of connection, between navigable, visible, and implied spaces is what ultimately makes things possible in a graphically based medium like the video game, and that is why dimensionality plays a key role as the fundamental basis of game worlds, becoming the spatial foundation on which everything else depends.

Beyond the success of two-dimensional single-screen classics such as *PONG* (1972), *Breakout* (1976), and *Space Invaders* (1978), game designers soon found creative ways to simulate three-dimensional environments on the 2-D surface of monitors and flat screens, incorporating “all of the techniques used to imply depth in graphic art, including overlap, apparent size, linear perspective, foreshortening, texture gradients, aerial perspective, and shadowing, as well as parallax and the rotation of objects” (Wolf 2008). Early on, players could find racing games suggesting a vanishing point, such as *Datsun 280 Zzzap* (1976) or *Night Driver* (1976), where the three-dimensional effect was possible thanks to scalable sprites that were enlarged and reduced, creating the illusion of movement along the z-axis; a few years later, games such as Midway’s *Laguna Racer* (1977) and Activision’s *Robot Tank* (1983) used texture gradients to create depth of field within the image, altering the optical appearance and spacing of parallel lines depending on their distance to the horizon.

The arrival of vector graphics in the 1970s allowed designers to draw lines at different angles, facilitating the illusion of 3-D spaces, such as the moving road of *Speed Freak* (1978), which featured one of the first truly three-dimensional objects in game history: an oncoming car driving from the background to the foreground. A couple of years later, the first-person tank combat arcade *Battlezone* (1980) employed similar wireframe vector graphics to generate a pseudo 3-D battleground on a flat plane, with the player using a radar to find and destroy enemies while being attacked by other tanks and missiles.

Another technique used to create illusions of three-dimensional space was overlapping planes at different scrolling speeds, with distant landscapes in the background moving slower than closer graphics in the foreground. The arcade *Moon Patrol* (1982), for instance, enhanced this parallax effect using very different colors to distinguish between moving planes: black for the backdrop sky, blue for the distant mountains, green for an alien city in the middle, and brown for the planet’s surface, where the vehicle moved jumping obstacles and shooting enemies. In those same years, parallax was also with images in stereo pairs for creating 3-D games. Special viewers and glasses with spinning discs were used for titles such as SEGA's *Subroc-3D* (1982) and also as peripherals for consoles like the Vectrex, inaugurating a tendency that peaked in 1995 with Nintendo's Virtual Boy, a home system entirely designed around 3-D that required players to look through a viewer at red monochrome screens.

But despite such technological breakthroughs, the eyestrain and the need for additional peripherals prevented these games from becoming mainstream, so until the spread of real-time three-dimensional computation in the late 1990s and early 2000s, the biggest revolution in terms of game dimensionality was axonometric perspective. SEGA's *Zaxxon* (1982) was the first game to employ axonometric projection simulating three dimensions from a third-person viewpoint, allowing the player to pilot a spaceship through enemy lines that cast a shadow indicating its height. Such diametric and oblique perspectives had certain advantages, allowing characters to move around as sprites that did not need to change in size, such as the protagonist of *Q*bert* (1982), who jumped on a pyramid of cubes while avoiding obstacles and enemies. Soon enough, axonometric views allowed designers to multiply levels of action inside the screen, as in *Crystal Castles* (1983) or *Marble Madness* (1984), where the up/down and diagonal exploration of forking paths was key. This lesson was well learned by indie puzzle games that reinvented the possibilities of isometric perspective decades later, from *Echochrome* (2003) to *Monument Valley* (2014), requiring players to read space both as two-dimensional and three-dimensional, depending on the chosen perspective.

Along with axonometric projections, there were other methods for games to simulate a third dimension without truly having one, such as pre-rendered images, the use of which increased with the arrival of laserdisc and CD-ROM technology that allowed for storage of higher-quality imagery in the form of live-action video (*Firefox* [1984]), hand-drawn animation (*Dragon's Lair* [1983]) or computer-generated images (*Cube Quest* [1984]). In graphic adventures such as the *Myst* series, for instance, different kinds of pre-rendered imagery that ranges from flat stills to 360-degree panoramas convey a sort of suspended dimensionality, like the mysterious sculptural stillness of *tableaux vivants*.

Throughout the 1990s, a considerable number of games combined 2-D and 3-D elements to simulate three-dimensional spaces without consuming too much processing power: fighting arcades such as *Virtua Fighter* (1993) and *Tekken* (1994) featured polygonal 3-D characters moving in 2-D pre-rendered landscapes, and, conversely, first-person shooters with immersive three-dimensional levels such as *DOOM* (1993) saved computing power by using 2-D sprites to model their characters, creating a blend of mazelike depth and gruesome figurality reminiscent of Francis Bacon's paintings.

The path toward actual 3-D computation required more processing power for the games to be able to render photo-realistic environments in real time, going beyond the abstract and geometrical shapes of games such as Atari's *I, Robot* (1983), the first three-dimensional arcade with filled-polygon graphics. So it was not until the arrival of the fifth generation of home consoles (1993–2002) with 32-bit and 64-bit processors that polygonal 3-D imagery became dominant in what could be considered a paradigm shift that transformed game culture as a whole, especially when long-established 2-D franchises such as *Super Mario* or *The Legend of Zelda* transitioned to fully three-dimensional game worlds with *Mario 64* (1996) and *Ocarina of Time* (1998), respectively. Millions of players who had grown accustomed to the flatness of scrolling platformers faced the not inconsiderable challenge of learning how to move their avatars in a brave, new, and overwhelmingly three-dimensional world. Sometimes designers had to draw on optical tricks such as dark lightning (*Tomb Raider* [1996]), aerial perspective (*Grand Theft Auto* [1997]) or even fog (*Silent Hill* [1999]) to conceal technical limitations (Wolf 2008), but, eventually, a majority of mainstream video games ended up embracing the photo-realistic rewards—as well as the anthropocentric constraints—of three-dimensional imagery.

Even so, despite computational improvements allowing for increasingly realistic graphics, in the late 2000s, many indie designers chose to restrict (rather than expand) dimensionality in their games, rediscovering what French philosopher Gaston Bachelard once wrote about in *The Poetics of Space* (1958). Limiting dimensional realism can be a fruitful approach to innovation, proven by the botanical games of Amanita Design or the nonanthropocentric viewpoints of Jenova Chen's *flOw* (2006) and *Flower* (2009): in the former, players control an aquatic microorganism through a series of two-dimensional planes, stacked vertically upon each other from a top-down view; in the latter, players control the wind, blowing a petal through the air in a three-dimensional world where dead fields are traversed and revived with luminal colors. Moreover, restricting dimensionality on purpose can carry ideological and political implications, as in *Papers, Please* (2013), where the archaic and deliberately rigid nature of space (the player acts as a border immigration officer in a dystopian Soviet country) enhances the game's critical view of European history, limiting dimensions to foster critical thinking. What these games ultimately suggest is that dimensionality is a relative concept, something cleverly proven by the non-Euclidean worlds of many games, from *Asteroids* (1979) and *Adventure* (1979) to the *Portal* series, where spatial connections generate stimulating gameplay despite being physically impossible.

Dimensional transformations can also take place as glitches and other spatial ruptures, which may be recorded in machinima (with characters floating or trapped in anti-spaces) or created on purpose by hacking game cartridges (like new media artist Cory Arcangel). Even fractal physics have been used to produce unconventional game dimensionality (*Marble Marcher* [2018]), not to mention the ingenious design of Robin Baumgarten's *Line Wobbler* (2015), a one-dimensional dungeon crawler game made out of a door-stopper spring and a long LED strip, that allows the player to negotiate obstacles and fight enemies in a single (luminous) dimension. It is even possible that the gameplay itself consists of revealing the dimensionality of an apparently nondimensional space, such as the blank page levels of *The Unfinished Swann* [2012], where players fire out dots of black ink to reveal the walls, doors and structures of a completely white three-dimensional environment (the opposite of the purposely dark screens of survival horror games such as *Penumbra* [2007] and *Amnesia* [2010]). In fact, depending on how we measure dimensionality, text-based adventure titles such as the *Zork* series may be regarded as nondimensional games, and even time could be considered a spatial dimension in and of itself, particularly when players activate the so-called bullet mode in games like *Max Payne* (2001) or the *Fallout* series, slowing down the movement of time to enhance spatial awareness.

Such effects can be altered and combined using mixed or contingent dimensionality. On that note, a particularly sound example of dimensional metamorphosis happens in *FeZ* (2012), where the player owns a hat that reveals her two-dimensional world to be one of the four sides of a more complex three-dimensional world, therefore rotating between labyrinthic 2-D views to reposition platforms and solve puzzles (a game mechanic that dates back to *Nebulus* [1987] and other titles, such as *Paper Mario* [2007] and *Crush* [2007]). In fact, the possibility of overlapping different planes of existence or alternate versions of 3-D worlds, as in the *Legacy of Kain* series, has allowed game designers to experiment with expanded dimensionality and juxtapose different layers of graphic representation (material, chromatic, spectral) within the same space. The forthcoming indie game *Miegakure*, for instance, makes four-dimensional movement possible as players explore the fourth dimension in the same way that a two-dimensional being would explore the third, wandering through a series of multilayered platforms that appear, disappear, and reappear like blinking Zen gardens.

Another type of mixed dimensionality takes place in virtual reality (VR) and augmented reality (AR) games, where computer-generated spaces and real locations juxtapose, questioning the limits of human perception. Not by chance, the biggest and most powerful tech companies are making strategic moves to set the pace in AR games, such as Google with its internal start-up Niantic, which is responsible for *Ingress* (2013), *Pokémon GO* (2016), and the forthcoming *Harry Potter: Wizards Unite*. Even classic toy companies, such as Hasbro and LEGO, are developing new AR apps to reshape the playing experience (as well as the informal education) of children with computer-generated imagery.

So, now that anyone going for a stroll in any city in the world may find large groups of people hanging out in silence and pointing their mobile phones toward the landscape, it seems clear that the ontological fabric of dimensionality as we knew it is being radically altered—in and out of game worlds, an anthropological shift, more than a merely technological one, that will determine the social and legal status of communal space in the future. Because, after all, as Ursula K. Le Guin would say, where are the ethical and political boundaries in an unknown dimension?

Manuel Garin

See also: Graphics; Z-Axis Depth

Further Reading

Bachelard, Gaston. *The Poetics of Space*. New York: Orion Press, 1964.

Garin, Manuel, and Oliver Perez. “Between Worlds and Stories: Science Fiction and Gameplay Experience.” *Formats: Journal of Audiovisual Communication* 5 (2009). Available at http://www.upf.edu/materials/depeca/formats/pdf_/art_dos_ing6.pdf.

Jenkins, Henry. “Game Design as Narrative Architecture.” In *First Person: New*

Media as Story, Performance, and Game, edited by Noah Wardrip-Fruin and Pat Harrigan, 118–131. Cambridge, MA: MIT Press, 2004.

Krapp, Peter. "Of Games and Gestures: Machinima and the Suspension of Animation." In *The Machinima Reader*, edited by Henry Lowood and Michael Nitsche, 159–174. Cambridge, MA: MIT Press, 2011.

Wolf, Mark J. P. *Building Imaginary Worlds: The Theory and History of Subcreation*. New York: Routledge, 2012.

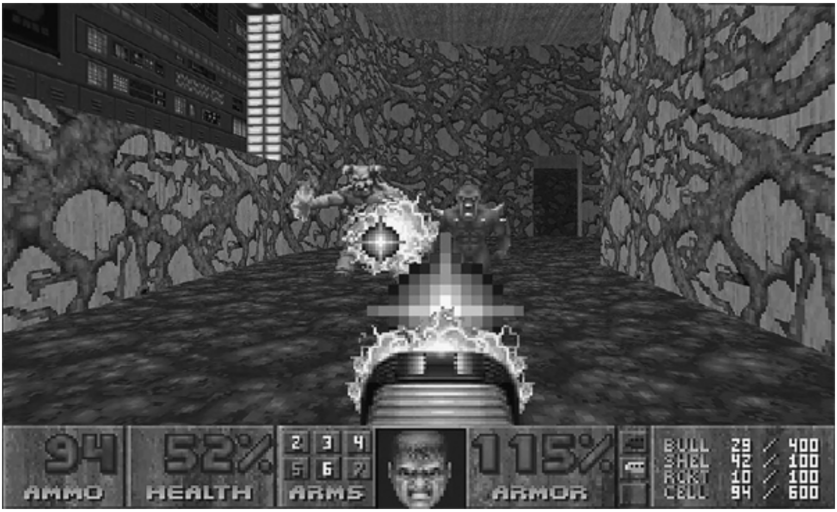
Wolf, Mark J. P. "Theorizing Navigable Space in Video Games." In *Logic and Structure of the Computer Game*, edited by Stephan Günzel, Michael Liebe, and Dieter Mersch, 36–62. Postdam, Germany: Postdam University Press, 2010.

Wolf, Mark J. P. "Z-Axis Development in the Video Game." In *The Video Game Theory Reader 2*, edited by Bernard Perron and Mark J. P. Wolf, 151–168. New York: Routledge, 2008.

DIP Switches. *See* Dual In-Line Parallel Switches

DOOM

Developed and published in 1993 by Id Software, *DOOM* became a pioneer in the world of video games for having popularized the first-person perspective in the shooting game genre. It paved the way for several similar titles, such as Bungie Software's *Marathon* (1994) and 3D Realms' *Duke Nukem 3D* (1996), clones that joined the genre of first-person shooters. Although *DOOM*'s technical achievements are diverse, its most notable features are the novelty of three-dimensional graphics added to player-created expansions using composite data files and a vast potential of networked multiplayer gameplay via a cooperative mode and the notorious "deathmatch," a phrase coined for this game.



A screenshot of the game *DOOM*. (Courtesy of Mark J. P. Wolf)

DOOM's horror- and science fiction–themed storyline is set on Mars, soon after a teleportation experiment ran amok and all hell broke loose. Looking through the eyes of an unnamed character whose facial expressions are represented in the bottom center of the game interface, the player incarnates a space marine working for a multiplanetary consortium, the Union Aerospace Corporation. Loaded with an arsenal of firearms and brass-knuckled fists, and a chainsaw in case ammunition runs out, this soldier must blast himself a way out. He will meet traps and search for keys in partly abstract environments, including facilities and mineral formations on Phobos, Deimos, and in Hell, where he must prevent the demonic hordes from invading Earth.

DOOM had a number of innovative features. In the outmoded three-dimensional space of its predecessor, Id Software's *Wolfenstein 3D* (1992), the ground level was on one horizontal plane corresponding with the horizon. Aiming with a weapon could only be achieved from left to right: no vertical direction or movements were considered. By presenting what is designated as a two-and-a-half-dimensional (2.5-D) game, *DOOM* improved the player's viewpoint in relation to the game's space; although the aiming remained a strictly horizontal action, ground level had variable heights, and characters could now be encountered from above or below (Boron 2007).

DOOM also had a similar software structure as its ancestor *Wolfenstein 3D*, consisting of folders that could be expanded through a distribution method that involved promotional shareware. Players downloaded the first parts for free and bought the remaining episodes if they wanted to complete the game. An intended side effect of this transparent architecture was that it allowed players to change the sounds and appearance of the game. During *DOOM*'s development, Id Software kept this concept in mind; its lead programmer, John D. Carmack, along with level designer John Romero, designed the core system so that game data were stored separately from the game engine, allowing players to extend the game. This practice inspired new shooting game mod-making and open-source communities that shaped popular video game culture (Kushner 2003), as *DOOM* source code was released by Carmack on December 23, 1997, under a not-for-profit (then GPL) license. Since then, the franchise has generated numerous expansions, sequels, and a reboot in 2016. Besides video games, spin-offs to the role-playing game (RPG) genre, and a conversion to virtual reality (VR) format, *DOOM* has also been adapted to novels, comic books, a film, and a board game.

Vincent Mauger

See also: Id Software

Further Reading

Boron, Dariusz Jacob. "A Short History of Digital Gamespace." In *Space Time Play: Computer Games, Architecture and Urbanism: The Next Level*, edited by Friedrich von Borries, Steffen P. Walz, and Matthias Böttger, 40–41. Basel, Switzerland: Birkhäuser, 2007.

Kushner, David. *Masters of Doom: How Two Guys Created an Empire and Transformed Pop Culture*. New York: Random House, 2003.

Pinchbeck, Dan. *DOOM: SCARYDARKFAST*. Ann Arbor: University of Michigan Press, 2013.

Door Games. *See* Bulletin Board Systems

Dual In-Line Parallel Switches

Dual in-line parallel (DIP) switches (the *P* can also stand for "package") are switches inside arcade video games that allowed operators to change certain game settings to customize the games and make them more appropriate for the specific audience of a particular arcade. By changing the settings, arcade operators could set the difficulty levels, the number of points needed for extra lives, the number of players, the number of rounds per game, the number of quarters the game would charge players per play, language (typically either Japanese or English), whether the music was on or off, attract mode settings, and so forth. DIP switch settings appeared in arcade games in the late 1970s in such games as Midway's *Checkmate* (1977), which could be set for multiple languages (English, German, French, or Spanish) and had a test mode for troubleshooting, and Exidy's *Fire One!* (1979), a submarine game.

The 1980s saw some interesting uses of these switches. For example, GAT's *Dambusters* (1981) had a DIP switch that could filter out swear words that players might leave on high score tables on the game. Bally/Midway's *Domino Man* (1983) had a DIP switch that could set the skin color of the game's main character to either "light-skinned" or "dark-skinned," depending on what the operator thought would be better for business, making it the first video game to cross color lines because one could choose the race of the main character. Other games, such as Toaplan's *Demon's World* (1989), had DIP switches to change between an English title screen and a Japanese one or to change the game's legal warnings or licensing information for different regions. Sex and violence levels could also be controlled by DIP switch settings; Midway's *Mortal Kombat* (1992) would use DIP switch settings to set the level of violence and blood displayed in the game's graphics, and a 1998 game, *Dead or Alive*++, a fighting game with buxom female fighters, had an operator control that could turn "breast bounce" on or off.

DIP switches were used into the early 1990s but were eventually replaced with less expensive battery-powered RAM. Because DIP switch settings could not be controlled by players, they could result in different gaming experiences, and arcade game scholarship must take them into account so that a single game variation will not be assumed to be the only one possible. Arcade game collectors are also interested in DIP switch settings.

Mark J. P. Wolf

See also: Arcade Games

Further Reading

RS Components. "What Is a DIP Switch?" Accessed September 11, 2020. Available at https://uk.rs-online.com/web/generalDisplay.html?id=ideas-and-advice/dip-switches-guide.

Duncan, Theresa (1966–2007)

Theresa Duncan was a writer, filmmaker, and game designer. Duncan designed several innovative CD-ROM games in the mid-1990s, including *Chop Suey* (1995), *Smarty* (1996), and *Zero Zero* (1997), which are strongly associated with the games for girls movement. Duncan also wrote widely for publications and for her blog, *The Wit of the Staircase*, which she launched in 2005.

Early in her career, Duncan worked at the World Bank in Washington, DC. At the World Bank, she met Monica Gesue in an elevator. Later, both Duncan and Gesue began working at Magnet Interactive. At Magnet, Duncan started as a writer and researcher on a Vietnam Veteran's Memorial project, and her writing ability enabled her to transition into more writing and design work. During this time, Gesue approached Duncan with an idea for an interactive story about two girls, which the pair pitched to Magnet. Duncan and Gesue further developed the idea over two years, and it ultimately became the CD-ROM game *Chop Suey* (1995). A critical and commercial success, *Chop Suey* was named the 1995 Game of the Year by *Entertainment Weekly*. The game relied on an impressive team of collaborators, including narration by David Sedaris, art by Svevonius, and music and sound by Brendan John Canty, who is best known as the drummer for Fugazi.

Central to Duncan's design philosophy is a focus on characters and their interrelatedness. "I've always liked characters," she explained in an interview. "I still do. I wanted to create a sense of inquisitiveness and wonder with characters—a kind of, 'Wow, what's going on here?'" (Cassell and Jenkins 1998, 175).

Duncan notes that girls have rich lives, with complicated feelings and ambivalent relationships; games designed for a "pure" girl are missing the socio-emotional needs of this demographic. Thus, this character-driven approach not only reflects Duncan's design aesthetic but also anticipates the games for girls movement of the mid-1990s. *Chop Suey* and Duncan's other titles were unique both for their focus on girls as a market and for their aesthetic, which drew from folk art and punk.

After leaving Magnet Interactive and Washington, DC, Duncan relocated to New York City, where she signed a contract with software publisher Tom Nicholson, which supported the release of two further games: *Smarty* (1996) and *Zero Zero* (1997). The artist Jeremy Blake (later Duncan's husband) provided visuals for both *Smarty* and *Zero Zero*, including more than three thousand for *Smarty* alone.

Duncan's computer-animated film *A History of Glamour* (2000) is a mock documentary that satirizes culture in 1990s New York. The work was a critical success and featured in the Whitney Biennial that year. While this initial success seemed to mark a transition into filmmaking, Duncan struggled to finalize a future film, *Alice Underground*, before her eventual death by suicide.

In 2015, the New York City–based arts organization Rhizome reissued Duncan's trilogy for play online after successfully crowdfunding the project.

Jennifer deWinter and Carly A. Kocurek

See also: Girls' Games

Further Reading

Cassell, Justine, and Henry Jenkins, eds. "Interviews with Theresa Duncan and Monica Gesue (Chop Suey)." In *Barbie to Mortal Kombat: Gender and Computer Games*, 172–191. Cambridge, MA: MIT Press, 1998.

Rhizome. *The Theresa Duncan CD-ROMs*. Accessed October 21, 2020. Available at http://archive.rhizome.org/theresa-duncan-cdroms/.

DVD and Blu-Ray Disc Games

Since 2010, the first year that more Netflix subscribers watched movies and television programs through streaming video than through DVDs, streaming video services have mostly replaced optical disc formats for consumer viewing (Chao, Hegarty, and Fray 2016, 104). At a board meeting in April 2011, Netflix formally separated its streaming and DVD/Blu-ray services, implementing a key strategic decision to shift its business model away from optical discs (Long, Suh, and White 2013, 3). The future of optical disc technology has dimmed quite a bit since then.

Subsequently, DVD and Blu-ray disc game development has more or less come to an end. Although games associated with major motion picture releases have continued to be made, marketed, and played, the focus has moved from optical disc technologies to downloadable or streaming gaming platforms, such as Steam (Wawro 2017). Even consoles may be gradually moving away from optical discs, with Microsoft reportedly making a 2019 version of the Xbox without an optical disc device (Fingas 2018).

With these major developments in consumer video over the last ten years, it would be easy to forget the immense success of DVD (introduced in 1995) and Blu-ray discs (introduced in 2003) in delivering feature films and other long-format video. Figures for consumer purchasing show that by the beginning of 2010, more than 80 percent of U.S. households had at least one DVD or Blu-ray player (Digital Entertainment Group 2009). The phenomenal market penetration of the DVD and Blu-ray brought an unforeseen new locale for video games. A steady number of releases included games playable on standard set-top players. Although the majority of these games are found on releases aimed at children, such as family-oriented animation, some clearly have an adult audience in mind by playing at a more challenging conceptual level. Even some of the earliest DVD games were quite sophisticated in a visual sense, deriving as they did from animated films with high levels of art direction. What was often lacking was design that involved setting more challenging interactive goals for the gaming audience (Falstein 2004, 47).

Because both DVD and Blu-ray discs share the market for household consumption of long-format video and work through the use of specialized set-top players, they also share many important characteristics in regard to audience and apparatus. This was even more apparent when considering the development of games on DVD and Blu-ray. The two types of optical discs are historically linked through the activity of the same developers and production companies, and for this reason, this entry covers games on both formats.

DVD GAMES

An early form of DVD game involved asking a series of yes-or-no questions. The DVD release of *The Cell* (2000) contained an “Empathy Test” as a special feature that first determined the viewer’s “emotional IQ” and next ascertained how “empathic” the viewer was. The game “measured” the viewer on an implied scale between the film’s empathic protagonist and its unempathic villain. Interestingly, whether the viewer was allowed to take the second part of the test depended on the emotional IQ result obtained in the first part of the test. If a viewer fell too close to the villain in emotional IQ, the game advised him or her to seek professional counseling and refused to proceed to the second part. The Empathy Test is a good example of two of the fabled “400 rules” for game design: “Provide an Enticing Long-Term Goal” and “Provide Clear Short-Term Goals” (Falstein 2002, 26). The individual questions of the test made up the short-term goals, whereas the long-term goal became the quest to finish the test and receive the final “diagnosis,” revealing how empathic the test-taking viewer was.

The DVD of *The Cell* is noteworthy for another feature: it is one of the first to contain a demo version of a computer game based on the film. It also has demos for the computer games *Homeworld* (1999) and *Homeworld: Catacylsm* (2000), which are included purely as advertisements (when the DVD was placed into a PC the demos were playable). This sort of product placement has been common in films since the 1970s but had never been directly positioned on an interactive vehicle like the DVD (Babin and Carder 1996, 33); the DVD of *The Cell* was ahead of its time in both these commercial strategies. This strategy has been continued and extended in other DVD releases, for example, *Van Helsing* (2004), which includes a one-level demo of the Microsoft Xbox game of the same name, and *Spider-Man 2* (2003; DVD, 2004), which has links to online games via MSN-Microsoft Online Gaming Network.

One of the earliest DVD releases to include video-based "games" was the Disney release of the Pixar film *Monsters, Inc.* (2001). Two of these games were created for a Japanese animated series (titled in English *Ponkickies 21*) and are merely short video clips depicting the host, "Go-Go" Connie-chan, introducing a simple guessing game. One of these games is the Japanese version of rock paper scissors called *Janken*, and the other is the *Lucky Door Game*, in which the object is to guess which one of the animated characters will come out of the door. Neither of these was genuinely interactive because the player simply made a guess or gesture while the clip ran to the end, revealing the outcome (with no input from the player).

The game *Peek-a-Boo: Boo's Door Game* had true interactivity through the DVD apparatus (the industry specification of the DVD format plus the physical hardware, which makes the specification a working reality; Baudry 1999, 346–347). This was essentially a guessing game as well and worked as follows: (1) an animation is played showing three doors being placed in a simplified form of what appears in the film; (2) the viewer picks one of the doors; (3) an image of a location from the film is shown on the screen; (4) the DVD apparatus waits for the viewer to choose a visual location on the image that might hide a missing door piece; (5) if the user guesses correctly, a reward is given; (6) the game repeats until all the missing parts of the door are found. The video segments between the choices were primarily designed to segue from one choice-making opportunity to another.

The subsequent DVD release of *Lilo and Stitch* (2002) brought a greater complexity to DVD gameplay by breaking its game into two interactively distinctive styles of play that combine the ideas of *The Cell* with *Monsters, Inc.* Dr. Jumba Jookiba, the evil mad scientist who created Stitch, first poses a series of questions that when answered correctly activate an "injector." After activating all three injectors, the viewer must correctly choose the order of the chemical ingredients to create a new life-form. The creature-creation game requires both memory skill and pattern matching. Critically, the video elements take on a new role in the gameplay, working as particular responses to the viewer's actions and not simply as transitional elements between choices. They provide a sense of real-time interactivity that was missing in *The Cell* and only minimally employed in *Monsters, Inc.*, and the game marks a definite evolution from these earlier examples.

In 2004, New Line Entertainment released the DVD for *Elf* (2003), which contained four games: *Fix Santa's Sleigh* (a question-and-answer game), *Elf in the City* (a maze game), *Snowball Fight* (a first-person shooting game), and *The Race Down Mt. Icing* (a driving game). The maze game used video segments of moving streams of traffic to block off sections of the maze, while the snowball fight showed video of snowballs both thrown at and thrown by the viewer. Of the four, *The Race Down Mt. Icing* most fully exploits the use of video segments to present a simulation of a luge-style run down a candy cane–strewn course. Each portion of the course appears as if it were displayed by a real-time render engine, but it is actually pre-rendered video. As the viewer passes from one area to another, obstacles such as giant candy canes or rolling snow boulders intervene, giving players a choice between moving right or left, ducking down, or jumping up, all of which are performed by pressing the appropriate buttons on the DVD remote. If the viewer chooses the correct direction, the video clip for the next portion of the course is played, and the game progresses. If the viewer makes an error, a video clip of a wipeout is played, and the viewer begins descending again at the point before the wipeout. To increase the sense of real-time rendering, the DVD software randomly changes the course in small ways by using different video clips for the same stretch of the course. The wipeout clips are also varied among three crashes so that each spill looks somewhat unique when occurring over different portions of the course. The appearance of complexity primarily relies on the careful preparation of many small pre-rendered video segments that can be concatenated together rapidly by the DVD player.

During 2005 to 2009, most DVD games followed the simple game designs pioneered by earlier games. The 2009 release of *Pinocchio* (1940) on DVD exemplifies this in the three games included as extras: *Pleasure Island Carnival Games*, a set of simple games with minimal interactivity; *Pinocchio's Puzzles*, a puzzle game hosted by Jiminy Cricket; and *Pinocchio Knows Trivia Challenge*, an interactive, multiplayer trivia game. Given the limited capabilities of the DVD apparatus (the rudimentary scripting language plus the underpowered processors of most players), other play experiences (such as simulation, first- or third-person shooting, and difficult tests of perceptual and motor skills) are more difficult to implement. The complexity of the games relies on the preparation of many small video segments that are played rapidly in succession depending on the viewer's interaction with the game scripts, with the result that the speed of the script-processing engine, the video decoders, and the reading speed from the disc all directly affect the performance of the game. Unfortunately, because of these constraints, the limits of DVD game design may have already been reached, leaving any further developments to Blu-ray Discs.

BLU-RAY GAMES

As Blu-ray Discs developed as a consumer format, games came to form an integral part of their content. The first commercial Blu-ray release (June 20, 2006), *Charlie's Angels: Full Throttle* (2003), included *Charlie's Angels: Angel X*, an online game playable when the disc was used in a computer but not in a set-top Blu-ray player. In May 2007, Disney released its first BD-J discs, for *Pirates of the Caribbean: The Curse of the Black Pearl* (2003) and *Pirates of the Caribbean: Dead Man's Chest* (2006). BD-J has been part of the Blu-ray specification since 2005 and implements a subset of the Globally Executable Multimedia Home Platform (MHP 2009). Based on Sun Microsystems' popular and robust Java programming platform, BD-J allows advanced interactive applications on home entertainment devices (Blu-ray Disc Association Application 6.2.4).

In the *Dead Man's Chest* extras, Disney included the Java-based game *Liar's*

Dice, based on the game of dice played in the film. The gameplay, although simple, uses the real-time rendering of menu overlays made possible in Java on top of pre-rendered video. The goal is to outwit the pirate Pintel (played by Lee Arenberg) in a game of dice. Starting with five dice, each player shakes and rolls them under the die cup. Over successive rounds, each takes turns bidding at the total number of dice held by both players showing a given number—one two die, two three dice, four six dice, and so on. Each successive bid must increase in quantity (e.g., from one three to two threes), in die value (e.g., from the three fives to one six), or in both. After each round, the losing bidder must forfeit one die, until the player with the last die wins the pot. This level of interactivity (and amount of machine strategy in its bidding) had never been accomplished on Blu-ray before, making this a high point of Blu-ray gaming.

The Blu-ray Disc for *Cars* (2006) included a highly interactive BD-J game with a new approach: the game was integrated into the movie itself. Make the "Carfinder" selection during playback, and it runs as the movie plays, presenting the viewer with three challenges that automatically appear at predetermined times during the film. The first displays a small interface that has various types of cars; the challenge is to select the correct car that matches the one appearing in the film. Each correct choice is added to the "Showroom," which allows the viewer to unlock special information and features about a vehicle, including its backstory, a 360-degree view, or images of other versions that were not used in the film. In the second, the screen freezes, and the viewer must find a certain type of car hidden in the frozen mise-en-scène; the quicker the response, the more points are scored. In the third, three images of the same car are displayed, with each one slightly different from the others. The viewer must find the correct match for a specific car in the mise-en-scène; again, the faster the car is found, the more points are gained. This innovative approach allows the film and game to intertwine, perhaps achieving a greater level of interest for repeated viewings of the disc.

Iron Man (film released May 2008; Blu-ray Disc released September 2008) returned to an old quiz game format for its one extra but added the BD-Live feature, allowing for the quiz contents to be updated from the internet. *Kung Fu Panda* (film released June 2008; Blu-ray Disc released November 2008) included two minimally interactive games: *Dumpling Shuffle*, a simple interactive game involving three bowls and a shifty dumpling, and *Dragon Warrior Training Academy*, in which players attempt fabled hero status by simple interactive strategies. Other Blu-ray releases with interactive games include those for the films *21* (2008), *Chicken Little* (2005), *The Day after Tomorrow* (2004), *Fantastic Four: Rise of the Silver Surfer* (2007), *The League of Extraordinary Gentlemen* (2003), *Men in Black* (1997), *Ratatouille* (2007), *Speed* (1994), and *National Lampoon's Van Wilder* (2002).

CONCLUSIONS

After tracing the historical development of DVD and Blu-ray games, three things stand out. Pattern matching, whether visual or semantic/syntactic (i.e., the answering of questions; Jurafsky and Martin 2000, 84), was the most common play strategy of all these games. Over time, they developed an appearance of interactive complexity sometimes reminiscent of console and computer games rendered in real time. For Blu-ray games, real-time interactivity became possible through the use of BD-J programming. The various combinations of the video elements produce a deeper sense of real-time interactivity at the heart of all electronic gaming.

These three linked observations meant that placing interactivity at the center of DVD and Blu-ray game design yielded better, more entertaining games that were often played repeatedly. The once common practice of providing two or more discs for a major film's release kept gaming content in demand. With the decline of this multidisc release strategy, the inclusion of DVD and Blu-ray games also declined.

As in console gaming, fixed capability hardware provided both a stable delivery platform and a troublesome bottleneck ("Brave New Worlds" 2003, 30–31). Moreover, a move toward game styles such as three-dimensional simulation, which requires indeterminate interactivity that is very difficult to pre-render, was far beyond the DVD player. Even with higher-levels of BD-J and BD-Live networking, game development for Blu-ray Discs has more or less come to an end (Dixon 2005, 60–61).

John Reid Perkins-Buzo

See also: Board Games

Further Reading

Babin, L. A., and S. T. Carder. "Advertising via the Box Office: Is Product Placement Effective?" *Journal of Promotion Management* 3, nos. 1–2 (1996): 31–51.

Baudry, Jean-Louis. "Ideological Effects of the Basic Cinematographic Apparatus." *Film Quarterly* 28, no. 2 (Winter 1974–75). Reprinted in Leo Braudy and Marshall Cohen, eds., *Film Theory and Criticism*, 5th ed. Oxford, UK: Oxford University Press, 1999.

Blu-ray Disc Association. *Application Definition Blu-ray Disc Format: BD-J Baseline Application and Logical Model Definition for BD-ROM*. March 2005. Available at http://www.Blu-raydisc.com/Assets/Downloadablefile/bdj_gem_application_definition-15496.pdf.

Blu-ray Disc Association. *White Paper: Blu-ray Disc Format: 2.B Audio Visual Application Format Specifications for BD-ROM*. March 2005. Available at http://www.Blu-raydisc.com/Assets/Downloadablefile/2b_bdrom_audiovisualapplication_0305-12955-15269.pdf.

"Brave New Worlds." *GameState* (Summer 2003): 28–33.

Chao, Chiang-nan, Niall Hegarty, and Ingrid Fray. "Impact of Movie Streaming over Traditional DVD Movie Rental—An Empirical Study." *Journal of Industrial and Intelligent Information* 4, no. 2 (2016): 104–109.

Crawford, Chris. *Chris Crawford on Game Design*. Berkeley, CA: New Riders Games, 2003.

Digital Entertainment Group. "DEG Releases Third Quarter Home Entertainment

Results." Press Release, October 19, 2009. Available at https://www.digitaltvnews.net/?p=10943.

Dixon, Douglas. "Next Generation DVD Authoring." *DV* (February 2005): 58–64.

Falstein, Noah. "The 400 Project." *Game Developer* (March 2002): 26.

Falstein, Noah. "Paradigm Shifts." *Game Developer* (November 2004): 47.

Fingas, Jon. "Microsoft May Release a Disc-Free Xbox One in 2019." *Engadget*, November 6, 2018. Available at https://www.engadget.com/2018/11/16/microsoft-disc-free-xbox-one-rumor/ accessed 3/5/2018.

Heiland, Victoria. "Blue Highways." *eMedia* (December 2004): 16–22.

Jurafsky, Daniel, and James H. Martin. *Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition*. New York: Prentice-Hall, 2000.

Long, Rick, Inchul Suh, and Toby White. "Netflix: DVD-by-Mail or Online Streaming?" Case Study, *International Research Journal of Applied Finance* (2013). Available at https://docplayer.net/6533199-Netflix-dvd-by-mail-or-online-streaming.html.

Perkins-Buzo, John Reid. "Poised to Play: The Evolution of Games on DVD Releases." *International Digital and Media Arts Journal* (March 2005): 30–36.

Wawro, Alex. "Netflix for Indie Games: How Jump Aims to Help Devs Beat Discoverability Issues." *Gamasutra*, July 10, 2017. Available at http://www.gamasutra.com/view/news/301137/Netflix_for_indie_games_How_Jump_aims_to_help_devs_beat_discoverability_issues.php.

Dystopian Games

Dystopian games are a dominant subgenre in video game fiction. They take place in nightmarish futures and dark game worlds, settings worse than their developers' empirical surroundings, and stretch across science fiction genres, such as classical utopias and dystopias, cyberpunk, steampunk, posthuman stories, alternate histories, and postapocalyptic stories. To count as a dystopia, however, it is not enough for a game to virtualize a grim world in the near or distant future; the focus needs to lie on societal issues (Booker 2013, 5; Domsch 2015, 397). Game worlds such as Rapture from *BioShock* (2007), the Commonwealth from *Fallout 4* (2015), Neo-Paris from *Remember Me* (2013), or the Detroit of *Deus Ex: Human Revolution* (2011) explore real-world issues that are extrapolated into the future to have players explore them in their true magnitude, as "extensions or exaggerations of conditions that already exist" (Booker and Thomas 2009, 65). In this way, dystopian games make players aware of such things as rapturous forms of capitalism (as in *BioShock* and *Borderlands*, [2009]), the machinations of totalitarianism and sinister corporations (as in *Half-Life 2* [2004] and *Deus Ex: Human Revolution*), conflicts between ideologies (*Fallout 4*), humankind's inability to evolve past dark parts of their nature (*Metro 2033* [2010]; *MadWorld* [2009]), and the dangers of science and technology (*Remember Me* and *Watch Dogs* [2014]), to name a few.

Thereby, the method of addressing these issues is not didactic but avails itself of the sensualizing powers of fiction and its ability to convey themes implicitly. To do so, dystopian games involve players in estranged game worlds and dramatic, and sometimes satirical, plotlines that are built around a "fictional novum" (Suvin 1979, 69), a "cognitive innovation" (64). This novelty determines the logic of the world and its rules and defamiliarizes the surroundings players will encounter, granting them access to fantastic game worlds they have to make sense of (71). Often individuals or ideologies misuse the powers of the novum, which may include new technologies such as prosthetic limbs (*Deus Ex: Human Revolution*), devices to manipulate human memories (*Remember Me*) or time (*Quantum Break* [2016]), advances in gene therapy (*BioShock*), or simply an infection that transforms the game world into a postapocalyptic wasteland (*The Last of Us* [2013]).

Consequently, by postulating an imaginative leap but upholding the hypothetical possibility of the scenario, dystopian games function as warnings regarding contemporary tendencies the developers have deemed dangerous and that they present in "the defamiliarizing context of an extreme fictional society" (Booker and Thomas 2009, 65). Dystopian games, in other words, involve players in fictional trial actions that have them think and live through the ramifications of these tendencies (and the ethical dilemmas they entail) while inviting them to compare the estranged game world to their empirical surroundings.

HISTORY OF THE GENRE AND PLOT STRUCTURE

The history of the dystopian genre (in games) and its plot structure are closely tied to dystopia's function as a warning. Dystopian games involve players in confining rule systems and nightmarish game worlds that often seem "beyond redemption" (Schulzke 2014, 330) and, by doing so, address contemporary trends prevalent in a specific historical time period. Nonetheless, *hope*, in the sense of "gloomy optimism, fearing for the worst, hoping for the best" (Geoghegan 2013, 48) is always an option; otherwise, these games would be pointless (other than serving as a product for consumption). In this sense, dystopian games do not remain caught up in a cruel pessimism about the future, as they often explore potential routes leading through the nightmare into a hopeful, utopian direction. They thus stand in the tradition of the utopian philosophy, which generally aims to attain social change and transformation through continuous negotiation and the struggle toward a better world (Vieira 2010, 22–23).

One can already discern this emancipatory function in the early games of the 1970s and 1980s, although their critique of the status quo remains marginal—and one might say, they are simply products for entertainment. Games such as *Death Race* (1976) and *Robotron: 2084* (1982) confront players with dark, rudimentary worlds and waves of never-ending enemies to eliminate. Even though they implicitly address issues such as humankind's desire for violent spectacle and the evolutionary fear that robotic life-forms will replace us, their focus on combat, without giving much context, robs them of their critical nature, in contrast to the film *Death Race 2000* (1975), for example. In fact, *Death Race* sparked a discussion in the United States about violence in video games and the role of interactivity when running over pedestrians could not be explained as easily by the population's sadistic desire for violence (which, when seen in context to the movie, the game wonderfully illustrates).

This sense of agitation about the future, which the dystopian genre elicits and that Frederic Jameson has called a "*disruption* (*Beunruhigung*) of the present" (2005, 228), is more palpable in *Manhunter: New York* (1988), in which Earth's population has been robbed of their freedom by a race called the Orbs. The game makes use of the traditional dystopian plot structure: the clash between the "official narrative," the depiction of the dystopian society, and the "oppositional counter-narrative" (Moylan 2000, 152), which brings forth a rebellion against the ruling order conducted by dissident thinkers (xiii; Baccolini and Moylan 2003b, 5). Players take on the role of an operative for the Orbs, tracking down human rebels, but they eventually become wary of the Orbs' true objectives (to harvest humans as a source of food). This is when players change sides and work to liberate Earth, which nonetheless ends with destruction and mass murder.

The pessimism of *Manhunter: New York* is beyond doubt and can be found in many games of the 1980s and 1990s. There is, for instance, *Syndicate* (1993), in which players are unknowingly in charge of a corporation in a ruthless struggle for dominance; *Shadowrun* (1993); *A Mind Forever Voyaging* (1985); and *I Have No Mouth, and I Must Scream* (1995), which involves players in a journey through infernal punishment without the possibility of winning the game. All the above-mentioned games, then, tackle fears of the era in different ways, including Cold War anxieties, the American population's desire for entertainment (with cable TV going mainstream), electronic innovations and the appearance of the internet (evoking fears of artificial intelligence [AI] and robotics), and a reinvigorated capitalism governed by multinational corporations. They thus stand in the tradition of classical dystopian fiction such as E. M. Forster's short story "The Machine Stops" (1909), Aldous Huxley's *Brave New World* (1932), and the genre's prime example, George Orwell's *Nineteen Eighty-Four* (1949). Hope in these stories lies outside the story or game world (the diegetic characters are doomed to failure) and is left to readers and players: to learn from the fictional experience and not let it happen in their world (Vieira 2010, 17).

Within the 1980s and 1990s, a further variant of dystopian games emerged in tandem with film and the literary works of these times. Holding out the prospect of hope within the story and game world, the *critical dystopia* explores potential routes through the nightmare and toward a utopian horizon (Baccolini and Moylan 2003a, 239–240; Moylan 2000, 105ff., 147, 188). In these more "optimistic dystopias," players become responsible for finding the "flaw" within a "seemingly stable" system, triggering a chain of events that will "lead towards its destruction" (Domsch 2015, 401; cf. 401–402). The critical dystopia is the dominant form of dystopia in video game fiction and present in games from the mid-1980s and 1990s. These include, for example, *Strider* (1989), the arcade shooter *Revolution X* (1994), *Robotica* (1995), *Beneath a Steel Sky* (1994), *Crusader: No Remorse* (1995), and the optimistic sequels to their literary forebears *Neuromancer: A Cyberpunk Role-Playing Adventure* (1988) and *Fahrenheit 451* (1984). All of these games end on a hopeful or, at least, ambiguous notion and thus negotiate the spectrum between utopia and anti-utopia on more neutral grounds than classical dystopian games (Moylan 2000, 147, 157).

This tradition of critical dystopian games continues in the 2000s and 2010s, with only a few classical dystopian games emerging, such as *The Stanley Parable* (2013). An additional shift concerns games' *ludic genre* and *targets*. While dystopian games from the 1970s–1990s alternated between text and point-and-click adventures, real-time strategy and role-playing games (RPGs) depicted from an isometric point of view, as well as 2-D (and some 3-D) action games, the modern dystopia that has shifted almost exclusively to the action genre (and only a few games explore routes that are more diverse: for example, *Mirror's Edge* [2008] and *Papers, Please* [2013]). Most popular are first-person and third-person shooters, such as *Crackdown* (2007), *Dishonored* (2012), *BioShock Infinite* (2013), and *Wolfenstein: The New Order* (2014), as well as action-adventure games such as *Enslaved*: *Odyssey to the West* (2010) and *Horizon Zero Dawn* (2017). In addition, while still targeting totalitarianism and theocratic regimes, the negative impacts of capitalism, and the misuse of technology, a considerable shift toward environmental catastrophes and the end of the world, as we know it, is discernible. Most often, these are imagined in postapocalyptic worlds in which either nuclear fallout has given way to barren wastelands and anarchical structures (*Fallout: New Vegas* [2010], *Mad Max* [2015], *Rage 2* [2019]) or nature has reclaimed the planet in a nostalgic return. In the latter instance (*The Last of Us*, *Horizon Zero Dawn*, *Enslaved: Odyssey to the West*, and *Nier: Automata* [2017]), one often encounters a juxtaposition between an ancient technology-dependent capitalism that has failed and new forms of societies that have developed. These tend toward older forms of living (trying to reclaim a lost world) or explore alternative ways in balance with the natural world. Such environmentally focused games show a strong utopian impulse and move the critical dystopian genre into a decisively ecotopian direction.

FOUR VARIANTS OF DYSTOPIAN GAMES: A TYPOLOGY

As these examples muster, dystopian games oscillate in function between ludic entertainment (settings for actions) and a playful engagement with issues that plague our contemporary world. They are, in other words, multilayered artifacts that negotiate hope in different manners, often involving players directly into this equation. This gives rise to primarily four variants of dystopian games: three of which function as a strategy of utopia and can be seen as subversive responses to precarious times, whereas the first variant is rather a misfit.

The Anti-Utopia

The anti-utopia seeks to deceive players about its critical nature by involving them in pleasurable action to attenuate the system it represents. *Civilization* (1991), for example, involves players in the mechanisms of colonization that have them adopt the hegemonic point of view of Western cultures (Mäyrä 2008, 94). The game therefore exerts "hidden influence on its player" and can be seen as a strategy of the status quo to justify their ideology (98; cf. 95–101). A further example is *Call of Duty: Advanced Warfare* (2014). By participating in hectic combat and blindly following orders, players devolve into faceless participants in the wars of greater powers. Thereby, the antagonist (the corporation ATLAS) can be seen as a direct extrapolation of the U.S. military industrial complex on whose side (in the form of the resistance group SENTINEL) players are fighting.

The Classical Dystopia

In the classical dystopia variant, the prospect of hope lies beyond the bounds of the game world. The counternarrative results in failure, and the game world's characters (and, figuratively, players) are crushed by the dystopian regime. Examples include *Every Day the Same Dream* (2009) and *The Stanley Parable* (2013), which involve players in the confining mechanism of a bureaucratic consumer capitalism. In both games, the main protagonists are doomed to failure in their attempts to escape the system (the counternarrative). Such a militant stance may nonetheless trigger a subversive reaction in players, who, although having failed in the game world, may be driven to action in empirical reality. Other such games include *I Have No Mouth, and I Must Scream*, *Shadowrun,* and *A Mind Forever Voyaging.*

The Critical Dystopia, Variant I

In the first critical dystopian variant, the prospect of hope lies within the bounds of the game world but is predetermined by the game's system. Players follow a trajectory toward one or more utopian horizons (or ambiguous endings) and are assigned the role of a *catalyst*. There is, for instance, *BioShock Infinite*, which sends players to the utopian city of Colombia and onto a linear journey of redemption. Thereby, players are confronted with the sins of theocracy, racism, American exceptionalism, and bad fatherhood. In addition, *The Last of Us* involves players in a choice between two ways of living after an infection has wiped out large parts of the human population. The scientific enclave of the Fireflies aims to return to a status quo where humankind and a bureaucratic consumer capitalism reigned, whereas people in Tommy's settlement live in balance with the natural surroundings, which represents a space for a posthuman ecological utopianism (in the form of Ellie, who is immune to the infection). This decision is for Joel to take (the main protagonist and not the player) and ends the game on an ambiguous note. Other such games include *Watch Dogs*, *Mirror's Edge* (2008), *Half-Life 2*, *Tales from the Borderlands* (2014–15), and *Enslaved: Odyssey to the West*.

The Critical Dystopia, Variant II

In the last variant, the second type of critical dystopia, hope is negotiated between the game system and the players, who enjoy the choice of becoming catalysts. Consequently, every playthrough may result in either an optimistic, ambiguous, or pessimistic ending and negotiates the spectrum between utopia and anti-utopia in ambiguous terms. *Metro 2033*, for example, confronts players with the choice to repeat history and wipe out the Dark Ones with a nuclear missile blast or spare the posthuman race. To make this decision, however, players need a positive balance in the game's morality system (by making ethical choices throughout the game), which represents a difficult task. *Metro 2033* thus involves players in a conflict between ideologies and the uncanny fear of the Other. Moreover, it sets them between various positions (perspectives in favor of sparing the Dark Ones and those who wish to wipe them out) and has them negotiate the prospect of utopia through their own actions. Other games that follow this strategy include *Blade Runner* (1997), *BioShock* (2007), *Deus Ex: Human Revolution*, *Papers, Please*, *Fallout 4*, and *Nier: Automata*.

Given these four variants, it is easy to discern that the video game dystopia, as a genre, is highly prevalent and diverse in game fiction. It not only serves players as a reminder that something might be wrong with their world but also that something can and should be done to prevent the nightmare from becoming a reality. As a strategy of utopia, therefore, dystopian games are entertainment products that nonetheless look skeptically and quizzically into our future. They involve players in estranged game worlds and fictional trial actions with the aim to unveil societal wrongs, destabilize the status quo, and offer solutions to the dilemmas they represent.

Gerald Farca

See also: BioShock Series

Further Reading

Baccolini, Raffaella, and Tom Moylan. “Conclusion: Critical Dystopia and Possibilities.” In *Dark Horizons: Science Fiction and the Dystopian Imagination*, edited by Raffaella Baccolini and Tom Moylan, 233–249. New York: Routledge, 2003a.

Baccolini, Raffaella, and Tom Moylan. “Introduction: Dystopia and Histories.” In *Dark Horizons: Science Fiction and the Dystopian Imagination*, edited by Raffaella Baccolini and Tom Moylan, 1–12. New York: Routledge, 2003b.

Booker, M. Keith. “On Dystopia.” In *Critical Insights: Dystopia*, edited by M. Keith Booker, 1–15. Ipswich, MA: Salem Press, 2013.

Booker, M. Keith, and Anne-Marie Thomas. *The Science Fiction Handbook*. Hoboken, NJ: Wiley-Blackwell, 2009.

Domsch, Sebastian. “Dystopian Video Games: Fallout in Utopia.” In *Dystopia, Science Fiction, Post-Apocalypse: Classics—New Tendencies—Model Interpretations*, edited by Eckart Voigts and Alessandra Boller, 395–410. Trier, Germany: Wissenschaftlicher Verlag Trier, 2015.

Farca, Gerald. *Playing Dystopia: Nightmarish Worlds in Video Games and the Player’s Aesthetic Response*. Vol. 8. Bielefeld, Germany: Transcript, 2018.

Geoghegan, Vincent. “Darkness and Light.” In *Dystopia(n) Matters: On the Page, on Screen, on Stage*, edited by Fátima Vieira, 46–48. Newcastle-upon-Tyne, England: Cambridge Scholar Publishing, 2013.

Jameson, Fredric. *Archaeologies of the Future: The Desire Called Utopia and Other Science Fictions*. London: Verso, 2005.

Mäyrä, Frans. *An Introduction to Game Studies: Games in Culture*. London: Sage, 2008.

Moylan, Tom. *Scraps of the Untainted Sky: Science Fiction, Utopia, Dystopia*.

Boulder, CO: Westview Press, 2000.

Schulzke, Marcus. “The Critical Power of Virtual Dystopias.” *Games and Culture* 9, no. 5 (July 2014): 315–334. Available at http://gac.sagepub.com/content/9/5/315.

Suvin, Darko. *Metamorphoses of Science Fiction: On the Poetics and History of a Literary Genre*. New Haven, CT: Yale University Press, 1979.

Vieira, Fátima. “The Concept of Utopia.” In *The Cambridge Companion to Utopian Literature*, edited by Gregory Claeys, 3–27. Cambridge, UK: Cambridge University Press, 2010.

E

Easter Eggs

An Easter egg is a hidden feature present in a video game that is intentionally put in by the game's creator and is often made difficult to discover. To reveal the Easter egg, players must perform a special action or series of actions, such as finding a code, typing a special keystroke combination, or looking carefully at details in graphics that indicate the presence of something hidden. Easter eggs are usually funny and entertaining; they are "extras" for players and not essential to the games in which they appear. The pleasure they provide comes from the search for and discovery of these surprises or jokes. Looking for Easter eggs can become a game in itself because they are often part of the game but usually not a part of the main storyline or game mechanics (thus cheats and shortcuts are normally not considered Easter eggs). Easter eggs can be writings, pictures, sounds, videos, minigames, or even more complicated productions. For example, in *DOOM II* (1994), players could find a picture of John Romero (one of the creators of the game), and in *Super Mario Bros*. (1985), an entire underwater level was hidden as an Easter egg.

The first known Easter egg appeared in the Fairchild Channel F game *Video Whizball* (1978). The hidden feature was the programmer Bradley Reid-Selth's surname, "REID-SELTH," which could be unlocked and displayed when the right conditions and combinations of play settings occurred (Whalen 2012). Reid-Selth's Easter egg was only discovered in 2004; however, the first Easter egg ever to be *found* by players was the hidden screen credit "Created by Warren Robinett" in *Adventure* (1979) for the Atari VCS 2600, the first graphical adventure game. Atari did not credit game designers at the time, either within games or on packaging. Inspired by secret messages found by listening to a music album backward, Robinett decided to put a secret room in his game to display his colorful message on-screen. The hidden room was accessible only by discovering and picking up a single gray pixel called "the dot." The dot was located in the middle of a gray room and was so well concealed that Robinett was nearly sure that no one would ever find it; fearing the reaction of Atari executives, he never spoke about his secret. But in 1980, after the production of three hundred thousand copies of the game, a twelve-year-old boy discovered the secret room and informed the company. By then, Robinett had already quit Atari, but his initiative became well known.

In the now defunct magazine *Electronic Games*, Steve Wright, who was working for Atari, explained that this idea of hiding some surprises for players was good and evoked the idea of searching for Easter eggs on Easter Sunday, giving the hidden features their name. Atari even started planting Easter eggs in its games, and the phenomenon expanded into other video games. Examples of Easter eggs are now numerous, and Easter eggs can occasionally be found even in nongame software, including Microsoft Excel 2000 (a scrolling credit box), Microsoft Word 97 (a whole pinball game), and even Google Maps.

Although Easter eggs were once a well-guarded secret of the developers, they are now part of gaming culture. Hidden content and Easter eggs are now a marketing strategy, as many players like to search for them and display their discoveries on social media platforms, sometimes forming entire subcultures dedicated to finding hidden content. *Bioshock Infinite* (2013) is a recent example of a popular game that contained many Easters eggs, including a hidden level of difficulty called "mode 1999" (referencing the 1999 game *System Shock 2*).

Since the late 2000s, the information regarding games and their content is much more accessible than before, notably in game wikis, gameplay videos, and game forums. As a result, players are used to searching for hidden content in games, and it is usually found quickly. Despite the accessibility of the information concerning hidden content, Easter eggs have not been abandoned by developers. In fact, they are more common now than in the 1990s, sometimes even in game genres where they were not common before (e.g., in a multiplayer online battle arena (MOBA) such as *League of Legends* [2009]).

Maude Bonenfant

See also: Adventure; BioShock Series; Fairchild/Zircon Channel F

Further Reading

Riddle, Sean. "Channel F Info." Accessed September 12, 2020. Available at http://seanriddle.com/chanf.html.

Robinett, Warren, and Michael Thomasson. "Interview: Warren Robinett." 2003. Available at http://www.gooddealgames.com/interviews/int_Warren_Robinett.html.

Whalen, Zach. "Channel F for Forgotten: The Fairchild Video Entertainment System." In *Before the Crash: Early Video Game History*, edited by Mark J. P. Wolf, 60–80. Detroit, MI: Wayne State University Press, 2012.

Education (General)

There has been a growth of interest in the educational use of games, where *education* can broadly be defined as teaching and learning across one's life span. Evidence for this claim can be seen in the increase in the number of education and gaming conferences, books, journals, and foundations/grant agencies interested in supporting this work (Ferdig 2007).

There are at least three reasons for this expanded interest. First, there are recent empirical and theoretical research claims supporting the positive impact of games for teaching and learning (Gee 2003). Second, there is an increased availability of game development tools, most of which are open source; ALICE, RPGMaker, Microsoft's XNA, and MIT's Scratch are all examples of tools educators can use to develop innovative learning environments. A third reason is the increased use of games today. A 2018 Pew gaming study found that 43 percent of U.S. adults play digital games. The same study suggested that 84 percent of teens surveyed had a game console or had access to one (Perrin 2018). Finally, recent online data tracking 114 massive, multiplayer online games (MMOs) reports over 8.7 million subscribers (https://mmo-population.com/).

Games are used for educational purposes in either a direct or indirect method. A direct approach would be to use a game that teaches concrete skills or knowledge. For instance, a game might teach emergency workers proper procedures in responding to a fire. Conversely, an indirect approach provides players with gameplay that has indirect consequences or outcomes. For instance, a surgeon might hone hand dexterity while playing a sports game; a student might learn history while playing a commercial-off-the-shelf (COTS) war adventure game.

Much of the current research and practice on the educational use of games has directly focused on consumption of those games. Current and past pedagogic theories have suggested that play provides a safe and motivational environment for learners to try out knowledge and skills they have gained (Bettelheim 1987; Vygotsky 1967). Video game play (consumption) provides a point of interaction between learning and doing; it can enable the practical application of concepts, skills, and knowledge. Electronic games also offer added features of automation and complexity. Because play within electronic games includes interaction mediated through electronic hardware such as a computer or a gaming console, game rules are applied automatically through the electronic hardware. This, in turn, allows for more complex game worlds (Juul 2004).

The educational use of games can also include game development (Kafai 1998). Video game creation is important because it provides learners with authentic opportunities to create artifacts of their learning as well as opportunities for others to learn from their creations (Ferdig 2006). Developers end up having to learn content and skills as they prepare to create a meaningful and engaging environment for teaching and learning.

The use of the term *education* to describe gaming may lead some to reference work in K–12 settings or in colleges of education. Interest in the educational use of games may reside in multiple departments. Computer science, engineering, education, journalism, English, psychology, literature, anthropology, sociology, communication, advertising, and health are just some of the disciplines that are interested in the use of games. Therefore, a critical component of exploring the educational use of games is an understanding of the motivation behind the use of the game or game development (DiPietro et al. 2007). Some are concerned with the pedagogic use of games—how teachers and students can develop or consume games. Others are more interested in the psychological aspects of gaming, in which what is being learned or studied relates to educational concepts of expertise, motivation, or individual and social cognition. Still others view "learning" through games as what is known as *media effects*, or the study of how video games teach about violence, gender, and stereotypes. Finally, there are those interested in game design, usability, and human-computer interaction.

With these necessary but multiple perspectives, it becomes increasingly complex to summarize what we know about the educational use of games. The answer depends somewhat on the genre, discipline, and context in which the question is asked. Recent research has provided evidence that the success of educational use of games largely depends on how educators align the content, the learner characteristics, the pedagogy, and the design of the game (Ke 2009). All researchers seem to agree that more research within specific disciplines needs to be carried out to more completely understand the educational use of games.

Richard E. Ferdig

See also: Education (Job Training); Education (Religious)

Further Reading

Bettelheim, B. "The Importance of Play." *Atlantic Monthly*, March 1987: 35–46.

DiPietro, M., R. E. Ferdig, J. Boyer, and E. W. Black. "Towards a Framework for Understanding Electronic Educational Gaming." *Journal of Educational Multimedia and Hypermedia* 16, no. 3 (2007): 225–248.

Egenfeldt-Nielsen, S. "Third Generation Educational Use of Computer Games." *Journal of Educational Multimedia and Hypermedia* 16, no. 3 (2007): 263–281.

Ferdig, R. E. "Assessing Technologies for Teaching and Learning: Understanding the Importance of Technological-Pedagogical Content Knowledge." *British Journal of Educational Technology* 37, no. 5 (2006): 749–760.

Ferdig, R. E. "Learning and Teaching with Electronic Games." *Journal of Educational Multimedia and Hypermedia* 16, no. 3 (2007): 217–223.

Gee, J. P. *What Video Games Have to Teach Us about Learning and Literacy*. New York: Palgrave Macmillan, 2003.

Juul, J. "Introduction to Game Time." In *First Person: New Media as Story, Performance, and Game*, edited by Noah Wardrip-Fruin and Pat Harrigan, 131–142. Cambridge, MA: MIT Press, 2004.

Kafai, Y. "Video Game Designs by Children: Consistency and Variability of Gender Differences." In *From Barbie to Mortal Kombat: Gender and Computer Games*, edited by Justine Cassell and Henry Jenkins, 90–114. Cambridge, MA: MIT Press, 1998.

Ke, F. "A Qualitative Meta-Analysis of Computer Games as Learning Tools." In *Handbook of Research on Effective Electronic Gaming in Education,* Vol. 1, edited by R. E. Ferdig, 1–32. Hershey, PA: Information Science Reference, 2009.

Lenhart, A., S. Jones, and A. R. Macgill. *Pew Internet Project Data Memo Re: Adults and Video Games*. Washington, DC: Pew Internet & American Life Project, 2008.

MMO Data website. Available at http://www.mmodata.net (site discontinued).

Perrin, A. *5 Facts about Americans and Video Games*. Washington, DC: Pew Research Center, 2018.

Vygotsky, L. S. "Play and Its Role in the Mental Development of the Child." *Soviet Psychology* 5, no. 3 (1967): 6–18.

Education (Job Training)

The use of video games in education among adults often pertains to job training. For certain kinds of jobs, games can be designed to teach job-related skills or simulate decision-making situations, and the real-time interactive nature of video games means that reaction time can be factored into the abilities being learned and tested. Other areas tested by such games include technical abilities, aviation, medicine, and customer service.

The use of games for job training can be traced back to flight simulators and other vehicle simulators, for example, the *Bradley Trainer* conversion of Atari's *Battlezone* (1980) that was commissioned by the U.S. military. Training games can be seen as an extension of training videos used by corporations, as on-the-job training in general became more codified and structured during the 1980s and 1990s along with the growing integration of computer technology. Today, the use of games for corporate training is big business and a growing percentage of what are now termed *serious games*.

In 2000, the Digital Media Collaboratory at the University of Texas at Austin's IC^2 Institute introduced the EnterTech Project, which prepared students through simulated work environments. Throughout the 2000s, many corporations began using games for job training, and by 2008, a study by the Entertainment Software Association (ESA) found that an estimated 70 percent of major domestic employers used games for training purposes (Steinberg 2010). Examples of job training games include *Incident Commander* (2007) from the U.S. Department of Justice and BreakAway Games, about the coordination of disaster relief efforts; the MITRE Company's *Job of Honor* (2007), which is used for recruiting; and *The Cisco Mind Share Game* (2009) used for network certification training.

There have been four innovative trends in research and practice on games and simulations for job training. First, James Rosser has led research that demonstrated surgeons performed better after playing video games. In a 2007 study, Rosser and his colleagues compared laparoscopic skills and suturing capability with video game scores and video game experience. The authors reported video game skills and experience as significant predictors of laparoscopic skills. Their study also pointed to video games as practical tools for teaching surgeons (Rosser et al. 2007).

A second innovation has come in the form of using games and simulations for crowdsourcing job training; for instance, the U.S. Army built *America's Army* (2002), a software series aimed at supporting recruitment of soldiers. More recently, the U.S. Navy in collaboration with the Defense Advanced Research Projects Agency (DARPA) built a simulation called ACTUV (Anti-Submarine Warfare Continuous Trail Unmanned Vessel). The simulation asks players to keep track of enemy submarines. After playing the game, users can submit their results to DARPA, which will use crowdsourcing to develop new ways to train its submarine personnel (ACTUV website 2018).

A third important trend is related to the use of games to support job skills for those with special needs. Kwon and Lee (2016) completed a study that attempted to measure any increases in the speed and accuracy of tasks completed by users with developmental disabilities. Their research provided evidence that video games were useful for increasing efficiency and could serve as an important component of job training for those who struggle with some functions of executive control (such as motivation, memory, and attention).

A fourth trend relates job training to esports (public and social competitions based on digital games; see Gandolfi and Ferdig 2019). Colleges and universities now have competitive esports training programs, not just to teach students how to build games but also to compete and train to become an e-athlete—a job that could continue postgraduation (Johnson and Woodcock 2019).

A number of companies, including Minerva Software (formerly Cyberlore) and Marc Prensky's Games2Train, specialize in developing games for job training, and studies have shown that the interactive learning found in video game training is often more effective than traditional methods (Orland 2010). As of 2019, a growing number of professions are using games for training, including those of bartenders, surgeons, nurses, dentists, hospitality professionals, accountants, health plan advisers, appliance repair, truck drivers, firefighters, astronauts, spies, car salesmen, and more.

Mark J. P. Wolf and Richard E. Ferdig

See also: Education (General); Education (Religious)

Further Reading

ACTUV website. 2018. Available at https://www.darpa.mil/news-events/2018-01-30a.

Curet, M. J. "The Impact of Video Games on Training Surgeons in the 21st Century." *Archives of Surgery* 142, no. 2 (2007): 181–186.

EnterTech Project website. Accessed September 12, 2020. Available at http://web.archive.org/web/20000819053838/www.utexas.edu/depts/ic2/et.

"15 Professions That Are Using Games for Training." Mental Floss. Accessed September 12, 2020. http://mentalfloss.com/article/66066/15-professions-are-using-games-training.

Games2Train website. Available at https://www.techrepublic.com/article/games2train-scores-using-education-and-entertainment/.

Gandolfi, E., and R. E. Ferdig. "Beating a Fake Normality: The Phenomenon of E-Athletes with Special Needs on Twitch.tv." *Well Played* 8, no. 3 (2019): 63–88.

Jana, Reena. "Virtual Training—And It's Fun!" *Business Week*, 2006. Available at http://images.businessweek.com/ss/06/03/training_games/source/1.htm.

Johnson, M. R., and J. Woodcock. "'It's Like the Gold Rush': The Lives and Careers of Professional Video Game Streamers on Twitch.tv." *Information, Communication & Society* 22, no. 3 (2019): 336–351.

Kwon, J., and Y. Lee. "Serious Games for the Job Training of Persons with Developmental Disabilities." *Computers & Education* 95 (2016): 328–339.

Orland, Kyle. "Study: Workers Trained on Video Games Perform Better." Gamasutra, October 19, 2010. Available at http://www.gamasutra.com/view/news/31073/Study_Workers_Trained_On_Video_Games_Perform_Better.php.

Rosser, J. C., P. J. Lynch, L. Cuddihy, D. A. Gentile, J. Klonsky, and R. Merrell. "The Impact of Video Games on Training Surgeons in the 21st Century."

Archives of Surgery 142, no. 2 (2007): 181–186.
Steinberg, Scott. "Game Theory: Business Leaders Look to Video Games as the Future of Management Training." *Go Magazine*, March 2010: 96–99.

Education (Religious)

As an academic discipline, religious education seeks to use the social sciences to describe and prescribe strategies for religious growth and development. Religious education can focus on a variety of sacred concerns, including myth, ritual, symbol, scripture, doctrine, and experience. Although religious education formally encompasses a wide range of theological traditions, substantial research has been conducted within the primary contexts of Catholicism, Protestantism, and Judaism (Miller 1995). For example, Jeff Astley (1994) notes that religious education within a Christian context can and does encompass indoctrination, personal formation, reason, and emotion. A variety of video games explicitly and implicitly aim toward religious educational outcomes such as these.

Throughout the twentieth century, religious educators consistently called attention to the overlapping concerns of religion and education. In the first half of the century, Alfred North Whitehead ([1929] 1967) asserted that education at its best should artfully foster a joyful spirit of discovery, a passion for learning, a sense of ethical duty, and a reverence for mystery and eternity. Likewise, John Dewey ([1934] 1972) argued that the "common faith" of education shapes a general concern for human wholeness, imaginative self-expression, relational interconnection, and an aspiration for ultimacy. More recently, Philip Phenix ([1971] 1975) asserted that education seeks transcendence, which is expressed in terms of hope, creativity, wonder, awe, and reverence. Similarly, David Purpel (1999) associates education with the religious impulses toward mutuality, ecological concern, hospitality, human dignity, peace, and justice. In one sense, the concerns of religious education may seem to range very widely. In another sense, however, these concerns tend to fall into two general categories: the ethical (the moral-relational) and the transcendent (the aesthetic-aspirational).

Religious educators take a variety of views on the religious and educational dimensions of digital media within popular culture. For example, Ronald A. Sarno (1987) argues that the procedural and multimedia dimensions of the computer can sponsor a kind of religious education that allows learners to play an active role in their own religious education. Pierre Babin and Angela Ann Zukowski (2002) suggest that digital media can effectively sponsor religious education by addressing the imagination and facilitating meaningful relationships. Likewise, Mary Hess (2003) suggests that popular culture, including digital media, can provide an imaginative, participatory bridge to the resources of religious communities. Elsewhere, Hess (2004) recognizes that digital media may also limit the exercise of the imagination and the development of relationships in some cases. Dean Blevins (2008) understands digital media as a potential religious educational resource for the development of relationality and complexity or a sense of awe and mystery. Among these scholars, their religious educational concerns again tend to focus on the possibilities of the ethical and the transcendent.

Particular religious educational research in video game technologies is a newly emerging field. Michael Waltemathe (2003) suggests that video games provide a narrative and procedural platform for playful identity formation and ethical reflection—both concerns of religious education. Likewise, Christopher Scholtz (2004) argues that religious educational research in video games must account for the dual domains of both narrative and ludology as well as the reflective experience of players. Elsewhere, Scholtz (2005) suggests that the concerns of religious educational research can and do overlap with video game research concerns at the points of explicitly religious content, identity formation, longing and desire, daily rituals, fascination, and Mihaly Csikszentmihalyi's flow theory.

Other video game researchers note that religion within video games tends to suffer from a narrative and procedural incongruity. For example, Ian Bogost observes that explicitly religious video games often adopt the conventions of mainstream video game genres without regard for their implicit procedural rhetoric—a digital logic that undermines their overtly religious aims (Bogost 2007, 288). Similarly, Harry J. Brown argues that, without care, conventional video game procedures may overwhelm or undermine any religious messages that video games intend to communicate (Brown 2008, 104–107). For example, Brown notes that although video games often promote an ethic of concern for the weak, they also promote a reactive ethic of vigilantism and violence against all members of a given social class or oppositional alignment. Thus, Christian religious video games that import these procedures tend to carelessly undermine their own narrative message.

Many explicitly religious video games tend to leverage gameplay as a means to confront players with religious content. Notable examples tend to draw from the Christian tradition, including *Catechumen* (2000), *Left Behind: Eternal Forces* (2006), and *Heaven* (2010) and the Wisdom Tree Games series for the Nintendo Entertainment System (NES), including *Bible Adventures* (1991), *Joshua & the Battle of Jericho* (1992), and *Spiritual Warfare* (1992). More recently, Scripture Union utilizes gameplay mechanics as motivation to drive player behaviors of Bible reading and quizzing in *Guardians of Ancora* (2015), while Scarlet City Studios deploys a steampunk allegory for teaching biblical narrative in *The Aetherlight: Chronicles of the Resistance* (2016). Owen Gottlieb (2015, 2017) notes that, in the Jewish community, religious education through video games remains a controversial subject, though not without promise (2015). Heidi Campbell et al. (2014) broadly discuss various intersections between religion and video games, with occasional reference to religious educational matters.

Mark Hayse has analyzed *Ultima IV: Quest of the Avatar* (1985) in terms of religious education curriculum (Hayse 2009, 2010). In *Ultima IV*, the player practices critical ethical reflection to realize self-transcendence. Throughout gameplay, the player seeks to practice the virtues of a concealed "moral economy," which is only gradually revealed through "unfolding revelation." This tension creates an inductive gameplay experience that reflects the nature of religious experience—the quest for the good life in response to a divine direction that is only partially revealed. Hayse describes the structure of *Ultima IV* in terms of a "religious architecture" within which religious significance can emerge.

Mark Hayse

See also: Education (General); God Games; Morality and Ethics; Spirituality

Further Reading

Astley, Jeff. *The Philosophy of Christian Religious Education*. Birmingham, AL: Religious Education Press, 1994.

Babin, Pierre, and Angela Ann Zukowski. *The Gospel in Cyberspace: Nurturing Faith in the Internet Age*. Chicago: Loyola Press, 2002.

Blevins, Dean G. "Technology and the Transformation of Persons." *Christian Education Journal*, Series 3, 5, no. 1 (2008): 138–153.

Bogost, Ian. *Persuasive Games: The Expressive Power of Videogames*. Cambridge, MA: MIT Press, 2007.

Brown, Harry J. *Videogames and Education*. New York: M. E. Sharpe, 2008.

Campbell, Heidi, ed. *Playing with Religion in Digital Games*. Bloomington: Indiana University Press, 2014.

Csikszentmihalyi, Mihaly. *Flow: The Psychology of Optimal Experience*. New York: Harper and Row, 1900.

Dewey, John. *A Common Faith*. New Haven, CT: Yale University Press, [1934] 1972.

Gottlieb, Owen. "Design-Based Research: Mobile Gaming for Learning Jewish History, Tikkun Olam, and Civics." In *Methods for Studying Video Games and Religion*, edited by Vit Sisler, Kerstin Radde-Antweiler, and Xenia Zeiler, 83–100. New York: Routledge, 2017.

Gottlieb, Owen. "Jewish Games for Learning: Renewing Heritage Traditions in the Digital Age." In *Digital Judaism: Jewish Negotiations with Digital Media and Culture*, edited by Heidi Campbell, 91–109. New York: Routledge, 2015.

Hayse, Mark. "Religious Architecture in Videogames: Perspectives from Curriculum Theory and Religious Education." Ph.D. diss., Trinity International University, 2009.

Hayse, Mark. "*Ultima IV*: Simulating the Religious Quest." In *Halos and Avatars: Playing Video Games with God*, edited by Craig Detweiler, 34–46. Louisville, KY: Westminster John Knox, 2010.

Hess, Mary E. "Growing Faithful Children in Media Cultures." In *The Ministry of Children's Education: Foundations, Contexts, and Practices*, edited by Barbara S. Wilson, Mark Gardner, and James Satter, 126–150. Minneapolis, MN: Augsburg Fortress, 2004.

Hess, Mary E. "Practicing Attention in Media Culture." In *Mediating Religion: Conversations in Media, Religion and Culture*, edited by Jolyon Mitchell and Sophia Marriage, 133–142. London: T&T Clark, 2003.

Miller, Randolph Crump. *Theologies of Religious Education*. Birmingham, AL: Religious Education Press, 1995.

Phenix, Philip. "Transcendence and the Curriculum." In *Curriculum Theorizing: The Reconceptualists*, edited by William F. Pinar, 323–337. Berkeley, CA: McCutchan Publishing Corporation, [1971] 1975.

Purpel, David E. *Moral Outrage in Education*. New York: Peter Lang, 1999.

Sarno, Ronald A. *Using Media in Religious Education*. Birmingham, AL: Religious

Education Press, 1987.

Scholtz, Christopher P. “Fascinating Technology: Computer Games as an Issue for Religious Education.” *British Journal of Religious Education* 27, no. 2 (March 2005): 173–184.

Scholtz, Christopher P. “Religious Education and the Challenge of Computer Games: Research Perspectives on a New Issue.” In *Towards a European Perspective on Religious Education*, edited by Rune Larsson and Caroline Gustavsson, 256–267. Stockholm/Skellefteå, Sweden: Artos & Norma, 2004.

Waltemathe, Michael. “Religionsunterricht als Raum für Computer-Spiel-Kulture.” *Magazin für Theologie und Ästhetik* 24 (2003). Available at http://www.theomag.de/24/miwa1.htm.

Whitehead, Alfred North. *The Aims of Education and Other Essays*. New York: Free Press, [1929] 1967.

Egypt

In 2007, the Egyptian studio Al-Khayal was established with support from Egyptian technology funds and created *Buha* (2006), a comical adventure game based on a popular movie character (Mohamed Saed); however, the game was the only one the company produced. After that, many small studios ventured into casual mobile games but with no success; weak purchasing power in Egypt and lack of international or regional investment are the main reasons these studios were forced to adopt new types of products to survive. Some studios converted into art outsourcing companies, such as Majaz studios in 2013. Another example is Appsinnovate, founded in 2012, whose most popular game was *Toktok Drift* (2014), a mobile car drift game; however, it could not cover the production costs, and the company abandoned creating commercial games and focused on B2B and advertising games.

In 2011, Mostafa Hafez, a former developer who participated in developing Reality Engine 2005, which later was acquired by Epic Games, cofounded Instinct Games and gathered a team of developers to codevelop international titles, such as *Ark: Survival Evolved* (2017) and *ATLAS* (2018), both action/survival massively multiplayer online role-playing games (MMORPGs).

Another interesting studio that seems to have good prospects in creating authentic content is Rumbling Games, founded in 2016. Its game *Knights of Light* (2019), an open-world role-playing game (RPG) based on the Muslim conquest of Iraq, is the only console game that has been approved by Sony Entertainment and developed in Egypt.

Radwan (RAD) Kasmiya

See also: Middle East

Further Reading

Appsinnovate website. Accessed September 12, 2020. Available at http://

www.appsinnovate.com/about.html.

Instinct Games website. Accessed September 12, 2020. Available at https://www.instinctgames.com.

Majaz Studio website. Accessed September 12, 2020. Available at http://majazstudio.com.

Rumble Games website. Accessed September 12, 2020. Available at https://www.rumbling-games.com/en.

Elder Scrolls, The Series

The Elder Scrolls is a series of open-world role-playing games (RPG) that began with the release of *The Elder Scrolls: Arena* (1994). Initially developed by Bethesda Softworks, entries in the series have been released on multiple platforms, including PC, PlayStation 3, PlayStation 4, Xbox, Xbox 360, Xbox One, and mobile devices. The series comprises five main titles—*Arena* (1994), *Daggerfall* (1998), *Morrowind* (2002), *Oblivion* (2006), and *Skyrim* (2011)—and a number of expansions and spin-off games. The series is enormously successful, both critically and commercially, and is one of the most famous video game franchises. Modding and crowdsourced development of *The Elder Scrolls* games has been a popular and important focus of player engagement in the series.

While predominantly action RPGs, *The Elder Scrolls* games have experimented with other game genres, including the action game *The Elder Scrolls Adventures: Red Guard* (1998) and the collectible card game *The Elder Scrolls: Legends* (2017).

Core gameplay has varied between the entries in the series but usually involves some combination of world exploration, quest completion, combat, and, to a lesser degree, puzzle solving. The standard elements of RPGs—personalized character design, class, race and skill selection, leveling, gathering of weapons, armor and equipment, and engaging in dialogue and trading with NPCs—are all present, though with significant variation between the games of the series.

Common to *The Elder Scrolls* games is the richly detailed high fantasy game world set on the continent of Tamriel and its complex lore and world history. Tamriel is composed of a number of different lands with their own characteristic geography and inhabitants. Each of the main games of the series games is primarily set in one such geographical area. *Morrowind*, for example, is set in Vvardenfell, an island sitting within the Inner Sea and dominated by the volcanic Red Mountain. Inhabiting the Tamriel are a number of races, including several of humans and elves, lizard-like and catlike races (the Argonians and Khajiit, respectively), and orcs. Vvardenfell is home to the Dunmer, or Dark Elves. The different races have class-related abilities and bonuses. In *Morrowind*, the Dunmer have a racial resistance to fire.

The Elder Scrolls is known for its deep lore. The world contains a pantheistic religion, with many gods, or "Daedric Princes" (including Azura, Nocturnal, Molag Baal, and Sheogorath), watching over and frequently interrupting the events in Tamriel. Befitting its high-fantasy setting, parts of the games also take on other planes of existence, with the gods each having their own plane. Quests in the game frequently involve the player dealing with, or resisting, the interventions of some particular god in Tamriel.

The frequently complex plots of *The Elder Scrolls* games are set against a world history that includes complex geopolitics, various geological disasters—including the sinking of the majority of the continent of Yokuda—and mythic cosmology and prehistory. The background is repeatedly referenced in the questlines of gameplay but is also incidentally described in books and dialogue to be found in the game world.

Cosplayer dressed as the character Dovahkiin from the game *The Elder Scrolls V: Skyrim*. (Patrik Slezák/Dreamstime.com)

The action role-playing focus of the series began accidently in 1994 when work on a gladiatorial arena video game, led by Danish programmer Julian Le Fay, slowly took on more role-playing elements to become *The Elder Scrolls: Arena*, which was a modest commercial success. *The Elder Scrolls: Daggerfall* followed in 1996, featuring a huge procedurally generated world and deeper role-playing and class and skill systems compared to its predecessor. The spin-off games *Battlespire* (a simpler dungeon-based game) and *Redguard* quickly followed, though neither made a big impact commercially or critically. *Red Guard* saw the future director of the series Todd Howard join the development team.

The following game, *Morrowind*, would establish the series as a premiere gaming franchise. The game constituted a significant improvement in three-dimensional graphics over the previous entries and increased player freedom to divert from the main storyline. *Morrowind* was also released on Xbox, bringing the series to consoles for the first time. Jeremy Soules's music for the game, including the now famous main theme, would come to be very strongly associated with the franchise, and he would return as composer on future releases. Two expansion for the game, *Tribunal* (2002) and *Bloodmoon* (2003), followed.

The Elder Scrolls IV: Oblivion was released in 2006, with Todd Howard now directing the game. Of the many developments in the game, dialogue was now fully voice acted, which because of the limited number of voiced actors led to some criticism of the repetitive and frequently jarring nature of the voiced dialogue. Improvements were made in combat, and the game employed enemy scaling to balance the challenge of the game: the hostile mobs that spawned in an area were largely tied to the player's level. A new tool called Radiant AI was used to generate non-player character (NPC) behavior so that, for example, NPCs could be observing their daily cycles, working, eating and sleeping; these behaviors were sometimes integrated with gameplay. The production of the game also utilized procedural techniques to detail part of the large open-world environment, such as in the detailing of trees. Two expansions followed: *Knights of the Nine* (2006) and *The Shivering Isles* (2007). The game was also released for the PlayStation 3 in 2007.

The Elder Scrolls V: Skyrim was released for PC, Xbox, and PlayStation in 2011 and generated enormous critical acclaim and commercial success. The game takes place in the snowy, mountain-filled northern province of Skyrim. The plot involves the return to Tamriel of dragons, and the player's role as a so-called Dragonborn capable of performing powerful shouts in the dragons' ancient language. Expansions to the game—*Dawnguard*, *Hearthfire*, and *Dragonborn*—added extra content and abilities. Versions of the game were subsequently released for PlayStation 4 VR and the Nintendo Switch.

A massively multiplayer online role-playing game (MMORPG) entry in the franchise, *The Elder Scrolls: Online* (2014), was developed by Zenimax Online Studios and released for PC, PlayStation 4, and Xbox One. The game was originally received with lukewarm critical response, but after changing from a monthly subscription to a buy-to-play model in 2015, it has subsequently grown into a popular game for which new expansions—typically opening a new area of the continent of Tamriel—continue to be released. *The Elder Scrolls: The Blades*, released in early 2019, is a free-to-play game developed by Bethesda for mobile platforms such as Android and iOS.

The Elder Scrolls 6, a much-anticipated continuation of the main series of games, was announced at E3 in June 2018. The setting of the game drew intense speculation after a short teasing trailer was shown at the event.

Grant Tavinor

See also: Adventure Games

Further Reading

Bethesda's *Elder Scrolls* website. Accessed September 12, 2020. Available at https://elderscrolls.bethesda.net/.

Lees, Gina. "A History of the Elder Scrolls Series." Green Man Gaming. Accessed September 12, 2020. Available at https://www.greenmangaming.com/the-elder-scrolls-hub/a-history-of-the-elder-scrolls-series/.

Electromechanical Games

Before video games came to dominate the arcade, electromechanical games were the typical games found there. As their name implies, electromechanical games are coin-operated games that combine electrical and mechanical elements requiring playing skills and timing from the player. Many of these games were housed in a floor-standing wooden cabinet (often covered with colorful, fantastic game art), with player controls on a panel in front; game actions occurred behind a glass screen above the panel, a mode of exhibition that would be adopted by video arcade games.

Electromechanical games arose when purely mechanical arcade games were electrified, allowing game designers to include such features as lights, solenoids, motors, switches, and other electrical hardware into the games as well as electronic sounds. The most common type of electromechanical game is pinball, which first used electricity in 1933. Many video games and game genres can trace their conceptual roots back to electromechanical ancestors, including shooting games with mounted guns, driving and racing games with built-in steering wheels, bowling games, tank games, and plane and helicopter games. A number of video game controllers, like joysticks, can also be found on electromechanical games. Some games required physical skills and could not be duplicated by video games; in *Airball* (1971), players used jets of air to physically manipulate a ping-pong ball through various targets. Companies that produced early arcade games had often first produced electromechanical games, including Allied Leisure, Bally, Chicago Coin, Gottlieb, Midway, SEGA, and Williams. Occasionally, video game companies even produced electromechanical games, such as *F-1* (1976), made by Atari and Midway, or Atari Games' *3-on-3* (1993).

Although their numbers declined sharply during the 1970s as video games came to dominate the arcade, electromechanical games paved the way for video games by providing the manufacturers, themes, venues, conventions, styles, and audience that would allow the video game industry to grow as rapidly as it did. In many ways, electromechanical games determined much about how arcade video games would look and sound and what kinds of games would be made. To some extent, video game technology can be seen as a solution to the problems with games made with electromechanical technology, including those involving the games' interactive limitations (games had to be able to be built and operated mechanically and reset between playings) and their reliance on moving parts (electromechanical games required a higher level of maintenance than video games). Perhaps because they were the most unlike video games, pinball games survived and held their own alongside video games, although their numbers and popularity dramatically decreased.

Because of the way they quickly fell out of favor at arcades and their constant need for repair, working examples of electromechanical games are much harder to find today than old video arcade games, making it difficult for collectors as well as for researchers who wish to play them. Videos of them being played can sometimes be found online, and preservation attempts can be found at locations such as the Retro Arcade Museum in Beacon, New York, which houses a collection of several dozen electromechanical games.

Mark J. P. Wolf

See also: Arcade Games; Arcades

Further Reading

Alm, Chris. "Before There Were Video Games There Was the Wonderland Arcade." Ultra Swank, October 22, 2015. Available at http://www.ultraswank.net/roadtrip/before-there-were-video-games-there-was-the-wonderland-arcade/.

DeMaria, Rusel, and Johnny L. Wilson. *High Score!: The Illustrated History of Electronic Games*. 2nd ed. New York: McGraw-Hill, 2004.

Electronic Arts (EA)

Electronic Arts (EA) develops and publishes games for personal computers, the Nintendo Wii, Microsoft Xbox 360, Sony PlayStation 2, Sony PlayStation 3, PlayStation 4, PlayStation Portable, Nintendo DS, and cellular phones. The company generates its revenue by diversifying the games it publishes across these various platforms. EA develops games at studios around the world, including in Canada, the United States, the United Kingdom, Sweden, Germany, China, and Australia. It also houses quality assurance centers in Japan, India, Spain, Singapore, and South Korea. Given the vast size of the company and its considerable marketing power, EA has positioned itself as one of the leading game development and publishing companies in the world.

HISTORY

EA was formed in 1982 when Trip Hawkins, the company's founder and chief executive officer, resigned from Apple Computer. Hawkins intended that EA work as an independent publisher; it would be devoted to finding and promoting game developers and their games but would not create games itself. EA saw early success in publishing well-received and respected titles, including *Archon* (1983), *M.U.L.E.* (1983), *Seven Cities of Gold* (1984), *The Bard's Tale* (1985), and *Wasteland* (1988). The company continued its strict commitment to publishing until 1987, when it created the skateboarding game *Skate or Die!* (1987).

Hawkins left EA in 1991 and was succeeded by new CEO Larry Probst. Under Probst's guidance, EA quickly began a series of acquisitions of game development studios. The company purchased Origin in 1992, Bullfrog in 1995, Maxis in 1997, Tiburon in 1998, Black Box in 2002, Criterion in 2005, and Bioware in 2007. EA would take notice of a studio that had created a popular game, purchase that studio, and then have the studio generate sequels of the title they had popularized, profiting from publishing these sequels. John Riccitiello became EA's CEO in 2007 and continued following Probst's strategies for the company's growth by emphasizing the need for successful game franchises that build on successful intellectual property and continuing the acquisition of game development studios. In 2013, the then head of EA Sports, Andrew Wilson, was promoted to CEO. His appointment spoke to the importance of sports for the future of the company.

ELECTRONIC ARTS
EA
AFI PARK 2

Electronic Arts's office building in AFI Park 2, in Romania. (Radub85/Dreamstime.com)

EA has not only pursued the acquisition of game development studios; it has also aggressively acquired licenses to include various forms of popular culture in its games. In 1998, EA purchased an eight-year license to make games using soccer's FIFA and European Cup competitions. In 1999, the company acquired the license to the elite Formula One racing series. One of the most prominent license acquisitions occurred in 2004 when EA successfully negotiated for an exclusive five-year license with the National Football League and its players. These licenses allowed for the inclusion of real-world leagues, teams, and athletes in the company's sports games and enabled the company to more accurately create sports simulation games. These license acquisitions have not been limited to sports. EA has also forged licensing deals for games based on *Harry Potter* (2000), Marvel Comics characters (2004), and *The Simpsons* (2005). In 2008, EA partnered with Hasbro to create the prospect for games based on properties such as Nerf and the game Monopoly.

DIVISIONS

In 2008, EA reorganized itself into four major units: EA Sports, EA Worldwide Studios, EA All Play, and EA Competitive Gaming.

The EA Sports unit was originally formed in 1993. It uses its licenses for professional sports leagues, teams, and athletes to produce a variety of sports games that simulate different sports to varying degrees. Among the more prominent titles published by EA Sports include the *FIFA Soccer* and *Madden Football* series.

The EA Worldwide Studios unit was initially established in 2000 as EA Games and represents the largest of the four units; it focuses on creating big-budget blockbuster games. Studios under its banner include Criterion Games, EA DICE, and Bioware. Some examples of EA Worldwide Studios titles include the *Need for Speed*, *Star Wars Battlefront*, *Mass Effect*, *Dragon Age*, and *Battlefield* series.

The EA All Play unit focuses on lighter casual games marketed toward families, women, and children and typically played online or on mobile gaming systems. The *Pogo* web-based game website that EA acquired in 2001 serves as the primary responsibility for EA All Play, but the unit also increasingly focuses on adapting previous PC titles, such as *Spore* (2008) and *Tetris* (1984), and board games, such as Trivial Pursuit, Monopoly, and Scrabble, for cellular phones.

Finally, the EA Competitive Gaming unit is devoted to organizing, promoting, and operating esports competitions around the company's most popular multiplayer games. These games include the *FIFA Football*, *Madden NFL*, and *Battlefield* series. The unit was founded in 2015 and aims to broadcast EA-sanctioned competitions that further its respective communities of players.

CONTROVERSY

As the company has grown, EA has increasingly been beset by controversy. In 2004, a blog posting from someone self-identifying as "ea spouse" charged the company with working employees to exhaustion without providing overtime or additional compensation (EA_Spouse 2004). The posting triggered a class action lawsuit brought against EA by its employees that called for payment to be made for overtime (Feldman and Thorson 2004). The suit would be settled for $15.6 million two years later and caused the video game industry to reconsider its labor practices (Jenkins 2006).

The year 2004 also saw EA controversially acquire the exclusive license from the National Football League. Under competitive pressure from rival publisher 2K and its *ESPN NFL 2K5* (2004), EA signed a five-year deal with the NFL, which enabled it to become the only game company allowed to use NFL teams and players. Morris (2004) reported that financial analysts expressed concerns about how the deal limited consumer choice and prevented EA's competitors from producing an NFL game in the future.

The most recent controversy has seen EA come under scrutiny from politicians and European governments for their inclusion of in-game rewards, so-called loot boxes, in *Star Wars Battlefront II* (2017) and *FIFA 18* (2017). In April 2018, Belgium declared that the inclusion of loot boxes meant that EA was running and profiting from an unauthorized form of gambling. Belgium demanded EA remove these types of rewards from games sold in the country (Yin-Poole 2018). EA has yet to remove loot boxes in Belgian versions of their games and faces potential criminal charges from Belgian authorities.

Andrew Baerg

See also: Hawkins, Trip; Industry

Further Reading

EA_Spouse. "EA: The Human Story." LiveJournal, November 10, 2004. Available at http://ea-spouse.livejournal.com/274.html.

Electronic Arts. "FY 2008 Annual Report and Proxy Statement." 2009. Available at https://s22.q4cdn.com/894350492/files/doc_financials/annual/2008/2008_Annual_Report_and_Proxy_Statement.pdf.

Feldman, C., and T. Thorson. "Employees Readying Class-Action Lawsuit against EA." GameSpot, November 11, 2004. Available at http://www.gamespot.com/news/2004/11/11/news_6112998.html.

Jenkins, D. "Programmers Win EA Overtime Settlement, EA_Spouse Revealed." Gamasutra, April 26, 2006. Available at http://www.gamasutra.com/php-bin/news_index.php?story=9051.

MobyGames. "Electronic Arts, Inc.: Historical Events." Accessed September 12, 2020. Available at http://www.mobygames.com/company/electronic-arts-inc/history.

Morris, C. "EA's Big Deal: Touchdown or Fumble?" CNN: Money, December 14, 2004. Available at http://money.cnn.com/2004/12/14/commentary/game_over/column_gaming.

Surrette, T., and C. Feldman. "Big Deal: EA and NFL Ink Exclusive Licensing Agreement." GameSpot, December 13, 2004. Available at http://www.gamespot.com/news/2004/12/13/news_6114977.html.

Waugh, E. "A Short History of Electronic Arts." Business Week, August 28, 2006. Available at https://www.bloomberg.com/news/articles/2006-08-24/a-short-history-of-electronic-arts.

Yin-Poole, W. "Now Belgium Declares Loot Boxes Gambling and Therefore

Illegal." Eurogamer, April 25, 2018. Available at https://www.eurogamer.net/articles/2018-04-25-now-belgium-declares-loot-boxes-gambling-and-therefore-illegal.

ELSPA. *See* Entertainment and Leisure Software Publishers Association

Emotion

When someone plays a video game, different parts of the brain activate in a particular sequence. There is the binding of somatosensory information that then hits the emotion, or limbic, system that includes processing by the hypothalamus and amygdala. It is the emotion center that triggers a reflex emotion in the player in response to the environment presented: negative emotion to the threatening and unsafe and positive emotion to the comforting and safe. Either way, the stimulus is then processed by the reason, or "executive brain," system that includes processing by the orbitofrontal, prefrontal, anterior cingulated, and motor cortex areas. This reason system overrides the emotion center, telling the brain that the player does not have to actually run from the living room—or shoot the television set—when playing *Call of Duty* (2003).

In short, when we play video games, the stimuli or signals pass through the human brain's amygdalar-hippocampal system (where those signals have their first impact and leave their first trace), the left perisylvian region (where language is formulated), and the frontal cortices and their subcortical connections (where the distinction between real and fictional is made).

Both real-life emotions and fiction-elicited emotion signals follow the same neurologic circuits from the brain's emotional system to its cognition system and then *diverge* in their effects when the latter determines what kind of response is warranted: to act or react when the information is identified as pertaining to real life and to stop or not initiate action when the information is identified as pertaining to the make-believe of the video game. This is why when we play video games, our executive center knows they are not the same thing as reality, but the emotions already triggered can be felt as intensely as the real emotions triggered in a real-life like situation.

This pendular swing between video game somatosensory stimuli that triggers us to experience an emotion while telling us to respond in an *as if* way creates tension (reflex emotion) and "*dis*-tension" (the executive brain) that leaves an emotion residue. In a way, game design and play is all about this initial emotion trigger and the emotion residue that is left behind.

Of course, all this assumes a fluency with video game play in which the player knows the controllers well enough that he or she loses the sense of the mechanics of the playing; it assumes a literate video game player who, just as we do not think of grammar when speaking, does not think about the mechanics of play. The growing of our capacity for fiction-elicited emotions plays a central role, then, in our engagement with and creation of video games. Research in neurobiology has shown that there is also a rational, discerning function present, to a certain extent, in the limbic system, so the distinction between real and not real already begins to take shape at this level, before even reaching the "reasoning" areas of the brain. Also, the executive brain does not always completely override the limbic system.

VIDEO GAMES AND THE GROWING OF THE EMOTION SYSTEM

We arrive in the world with a fully charged emotion system: we cry when hungry or neglected and smile when touched and fed. Parents and caregivers function as surrogate reason systems until we grow our own. They sooth and inhibit so we can *think* instead of reflex emote. As we grow, our emotion and reason systems become more in balance; we even begin to *think* about the emotions we experience. Working together, the emotion and cognitive systems allow us to ponder, assess, and modify our actions—and sometimes in ways that run counter to our reflex emotions.

On both scores, what we are doing is growing our capacity for causal and counterfactual (and probabilistic) mappings of our physical world (objects and functions) and of the social arena (people and institutions). We get nice kickbacks here too. Whether a social or natural world occasion, when we plan, put into play, and accomplish a goal, we are rewarded with a neurochemical release of oxytocin and dopamine—the feel-good brain drugs. One way or another, video games trigger these causal and counterfactual mechanisms as the player follows its emotion blueprint: the particular pattern and predominant types of emotion present in any given game.

In many ways, what we call *genres* are a more formal way of understanding a video game's mood. How the emotion peaks (short in duration) in any given game adds up to that feeling (long in duration) that lasts after the game has been finished: action, adventure, horror, comic, and so on. In a sense, genre is really the formal expression of the cumulative effect of the dominant emotions experienced (either non-self-reflectively, as with basic emotions, or what we call *feeling*, or the aftereffect, metacognitive awareness that tells you an emotion occurred) during gameplay. So, the survival horror genre is designed for repeated encounters with danger, constantly conditioning the player's appraisal mechanism and what he or she will do next, either when alive again or when entering a new space.

One of the most dominant emotion patterns is that of reward: puzzle solving or overcoming obstacles to attain the goal of a game. Although the player's cognitive causal mapping of the natural world is at play in a shooting game like *Medal of Honor* (1999), it is the pattern of positive emotion (successfully advancing through the game by killing the enemy) that keeps the player going until he or she achieves the goal.

Other emotions arise in playing video games, including the one the player feels when *moved* by its aesthetic design. This can be a positive or negative reaction and can also determine whether the player returns for more. We can feel emotions toward characters as well. Again, this can be a range of emotions (as in a role-playing game [RPG]) or a rather simplified set of basic emotions (as in a shooting game). Video game designers can bring to a shooting game a greater range of emotion by using techniques such as narrative framing, writing and voice, and cutscenes. For instance, writing, voice, and cutscenes are used to intensify the third-person combat play and puzzle-solving tasks in *Uncharted 2: Among Thieves* (2009).

Video games that require the player to map social worlds heavily rely on social emotions; we grow these from infancy in our mapping of the complex webs of attachment to various loved ones. These games build in characters with interior states of mind and require the player to read subjective states and intentions of the characters encountered. Game designers therefore spend more time on ingredients such as facial expression and body movement, all of which trigger our theory of mind (or mind-reading) capacity. These games arguably also trigger the player's empathic faculty. There are specialized neurons in the brain that form a system that mirror another's action-oriented gesture. Video game designers intuitively create games that trigger this mirror neuron system (MNS)—the system that automatically allows us to understand actions and emotions in our brain's simulation of them—without any reflective cognitive processing, conceptual reasoning, or conceptual assessment. Video games that attend to facial expressions, micro-gestures, and body movements in their characters seek to activate the MNS—the reflex center for processing another's actions and emotions. This also helps explain why role-playing games (RPGs) and character-driven video games (more than, say, shooting games) trigger our empathic capacity more.

REAL-WORLD EMOTIONS EXPRESSED IN PLAY

Video game emotions are real-world emotions but without the real-world consequences. We experience shock, surprise, and fear when playing *Dead Space* (2008), but our reason system tells us that this is taking place in the realm of play and make-believe. This is why we do not have the more than 90 percent of kids who play video games (nearly half of which contain violence) actually shooting real people ("Fair Play" 2001; Kaiser Family Foundation 2002).

Video game designers create protected, exploratory environments in which the players can safely exercise their causal and counterfactual mechanisms. As social and natural maps take shape and players realize goals, neuropeptide release happens. Just as neuropeptides (like oxytocin) reward and create deep bonding and attachment between parent and child, so, too, the game (the implied designer) can reward (dopamine release) and create attachment. (There are, of course, tragic anomalies, such as the South Korean twenty-eight-year-old who died from heart failure after playing *StarCraft* [1998] for fifty straight hours without sleep or food.)

Certain video games seek to intensify the interactive and transformative nature of the game to heighten the player's experience of agency during gameplay. These are games that give the player a sense of learning and mastering of the game's social and natural world mappings in ways that matter—that can be felt as personalized in some way. Blizzard Entertainment's *World of Warcraft* (*WoW* [2004]) allows players to customize their avatars' physical appearance, race (e.g., orc, elf, or druid), profession, and skill sets as they set out on adventures that take place in a variety of resplendent terrains (such as cities, forests, jungles, and deserts).

Video games establish rules that involve the player's choices, obligations, prohibitions, and permissions. And video game play intensifies when unstated constraints are identified. Rules are necessary in the design of video games, right down to the actual binary codes used in the programming. They are also necessary for the players to emotionally invest in the game. The player needs to know or to discover the game's basic constraints to better explore and evaluate the options and to heighten the experience of emotions during gameplay.

This also means that there has to be a certain logic and coherence to the game. If the constraints are too tight (leaving little room for options) or the logic breaks down, the player stops investing emotionally. *Final Fantasy XIII* (2009) is aesthetically well crafted with compelling animation but too restrictive in its movement options; the rather mundane movement through does not elicit emotional investment in the game. The player may also stop investing emotionally if he or she senses that there is no way to lose and therefore no way to win either. *Heavy Rain* (2010) is a case in point. Although well scripted, narratively interesting with its shifts in point of view, and packed with expressive and detailed facial animation, it offers no emotional reward because it offers no way to lose.

Video games are about movement—our movement as actual players in an actual room toggling a controller or holding a Wiimote. In fact, it is the player's action-oriented dexterity that intensifies the immersion and therefore also the emotive payoff. It bears mention that there is a long history of scholarship (William James through Antonio Damasio) that seeks to make explicit all the consequences one may derive from the fact that many (if not all) emotions, according to James, are the products of physiological and neurological changes; we first produce the bodily symptom of an emotion and then *feel* the emotion. As such, when playing a video game, it is physical changes in the body (acceleration of pulse, surge of adrenaline, and contracting of muscles) that are detected first by the prefrontal cortex and somatosensory cortex and then by the emotion system. According to this approach, a video game's image and sound initiate bodily changes that trigger this biofeedback loop formed between body and brain that ultimately creates the feeling of the emotion.

Common experience and today's science tell us something a little different, however. We experience emotion just sitting and watching others play a video game, and, as science proves, the processing of video game sensory stimuli is a process that moves from the senses to the emotion system, to the reason system, and then back to the emotion system. If it were not so, we would not know the difference between the video game and real life; if it were not so, we would not be able relish in the residual of the real emotion felt in the fictional play.

Frederick Luis Aldama

See also: Reception Theory

Further Reading

Damasio, Antonio. *Looking for Spinoza: Joy, Sorrow, and the Feeling Brain*. Boston:

Houghton Mifflin Harcourt, 2003.

"Fair Play: Violence, Gender and Race in Video Games." Children Now (December 2001). Available at https://eric.ed.gov/?id=ED463092.

Freeman, David. *Creating Emotion in Games: The Craft and Art of Emotioneering*. Berkeley, CA: New Riders Games, 2001.

Kaiser Family Foundation. "Key Facts: Children and Video Games." October 1, 2002. Available at http://www.kff.org/entmedia/3271-index.cfm.

Vorderer, Peter, and Jennings Bryant. *Playing Video Games: Motives, Responses, and Consequences*. New York: Lawrence Erlbaum Associates, 2006.

Emulators

An emulator is a program used to play video games originally designed for another system. The most common usage for these programs is to emulate older game consoles (e.g., Atari VCS 2600, Nintendo Entertainment System (NES), SEGA Genesis) or older operating systems (such as DOS) through a modern computer OS (such as Windows or Mac OS). The program mimics the way the older machine renders graphics and sound so that the game experience is as similar as possible to what it was on the original system. Games are enclosed in ROM files (which replace the cartridges) and then read by the emulation program (which plays the role of a specific console) to be played within the newer interface.

Although the original software is often accurately embedded in a snapshot file, the newer hardware can be very different. Processors, sound technology, and monitors all have an impact on the output. Therefore, the emulation process affects the final appearance of the game: for example, aspect ratios, colors, sound, and speed. In addition, emulation cannot replicate the controllers of the console (such as arcade joysticks or home gamepads), so they must be replaced in the newer hardware configuration, inevitably altering the gameplay. For example, the NES Zapper, a pistol-shaped controller used for *Duck Hunt* (1985), has no suitable replacement on the average home computer setting. The easiest way to replace it —aiming with your mouse—leads to a completely different gaming experience. Yet, much effort is invested to improve the illusion: USB adaptors are available so that, for example, original SEGA Genesis gamepads can be used for home computer gaming.

Moreover, rather than only trying to mimic the original experience of a game, most emulators add new possibilities or features that were not present in the old system. These include fast-forward and backward functions; by pressing a key, the player can reverse gameplay for few seconds, going back to a time before being hit by an enemy, thus avoiding losing lives, using "continues," or restarting all over. Fast-forwarding allows the player to skip parts of the game sometimes judged uninteresting (such as cutscenes). The possibility to save states everywhere in the player's path—probably the most common of these new features—makes obsolete all game design effort to control the frequency of save points and decreases the difficulty of games that originally did not offer any save function.

If the emulator program itself is not really involved in legal issues, the files of game code reproducing them (referred to as *game images*) are usually unauthorized by copyright owners, forcing ROM files into underground circulation. But the emulation process is not always subject to legal issues. For example, Nintendo's Virtual Console offers NES, SNES, and Nintendo 64 games as well as others for the Nintendo Wii U and 3DS through emulation, and Sony PlayStation 3 used an emulator to play PlayStation games sold on the PlayStation Network. The NES and SNES classics, as well as PlayStation classic, all used emulation software to run original console games on newer hardware. Emulation let Microsoft, Nintendo, and Sony release games for some of their older consoles without having to change the original code.

These ways of using emulators show their importance for the retrogaming movement. Old game consoles may no longer be functional, but emulation gives a way for nostalgic players to access their games nevertheless. With MAME (which stood for Multiple Arcade Machine Emulator), an emulator of different arcade game and computer systems, some early video games mostly unavailable by any other means are now playable.

Emulators also increased the possibility of user-generated content related to old games. For example, emulators gave birth to homemade translations (such as the English translation of *Final Fantasy V* [1992] from Japanese before it was released in North America within *Final Fantasy Anthology* [1999] on the PlayStation). New games are also sometimes designed as if they are working on old platforms by using emulators, thus combining nostalgia and novelty.

Of course, emulation is a useful way for fans and researchers to discover games sometimes unavailable by other means. Game states are dematerialized and thus can easily be exchanged. Game FAQs, for instance, distribute game states uploaded by their users with leveled-up characters or rare items found or to directly experience the final boss. Nonetheless, one must remember that what is experienced with emulation programs is not exactly what was originally experienced with the original platforms.

Simon Dor

See also: MAME

Further Reading

Camper, Brett. "Retro Reflexivity: *La-Mulana*, an 8-bit Period Piece." In *The Video Game Theory Reader 2*, edited by Bernard Perron and Mark J. P. Wolf, 169–195. New York: Routledge, 2008.

Wen, Howard. "Why Emulators Make Video-Game Makers Quake." Salon, June 4, 1999. Available at https://www.salon.com/1999/06/04/emulators/.

Engines. *See* Game Engines

Entertainment and Leisure Software Publishers Association. *See*

Association for UK Interactive Entertainment

Entertainment Software Association (ESA)

According to its website, “The Entertainment Software Association (ESA) is the U.S. association exclusively dedicated to serving the business and public affairs needs of companies that publish computer and video games for video game consoles, personal computers, and the Internet” (Entertainment Software Association website 2010).

The ESA was founded by Doug Lowenstein in 1994 as the Interactive Digital Software Association (IDSA), which it remained until it was renamed in 2003 for the sake of greater concision. Its membership includes many major video game publishers who have a branch in the United States, and its office is located in Washington, DC, where it lobbies against government-imposed regulation censorship. The ESA is also active in business and consumer research for the video game industry and in intellectual property policy and anti-piracy programs around the world.

Lowenstein was president of the ESA until 2007, and during his tenure, the organization established the Entertainment Software Rating Board (ESRB) in 1994, the rating system that has become the standard used in the United States and Canada. The ESA (then IDSA) also established the Electronic Entertainment Expo (E3) Tradeshow in 1995 and the Academy of Interactive Arts and Sciences in 1996, which began giving its Interactive Achievement Awards in 1998 and in 2002 began the annual D.I.C.E. (Design, Innovate, Create, Entertain) Summit.

In 2000, the ESA began the ESA Foundation, which according to its website “is dedicated to supporting positive programs and opportunities that make a difference in the lives of America’s youth. The Foundation seeks to harness the collective power of the interactive entertainment industry to create positive social impact in our communities. We support geographically diverse projects and programs that benefit American boys and girls of all races and religions” (Entertainment Software Association website 2010).

Following Lowenstein’s departure in 2007, the next president of the ESA was Michael D. Gallagher, whose background included working as the Department of Commerce’s assistant secretary for communications and information as well as serving as director of the National Telecommunications and Information Administration. On October 3, 2018, Gallagher announced his resignation and that senior vice president Stanley Pierre-Louis would serve as interim president.

Mark J. P. Wolf

See also: Industry

Further Reading

Entertainment Software Association. *2009 Annual Report*. Available at https://craft.co/entertainment-software-association.

Entertainment Software Association website. 2010. Accessed September 12, 2020. Available at https://craft.co/entertainment-software-association.

Entertainment Software Rating Board (ESRB)

The Entertainment Software Rating Board (ESRB) is a nonprofit self-regulatory organization responsible for rating computer and video game content and the enforcement of advertising guidelines in North America. The ESRB was created in response to increasing concerns over video game violence and its effects on minors. By the standards of the early 1990s, the digitized graphics of certain games appeared unsettlingly realistic, including those of *Mortal Kombat* (1992), a brutal fighting game, and *Night Trap* (1992), a SEGA CD release using full-motion video (FMV), which tasks players with protecting a slumber party from vampire-like assailants. The two games took the spotlight during the joint hearings before the Subcommittee on Juvenile Justice of the Committee of the Judiciary and the Subcommittee on Regulation and Government Information of the Committee of Governmental Affairs of the 103rd U.S. Congress, held from December 9, 1993, to March 4, 1994, and headed by Senators Joseph Lieberman and Herbert Kohl. Faced with the prospect of federal regulation, the video game industry initiated efforts to adopt a voluntary rating system. In April 1994, the Interactive Digital Software Association (now Electronic Software Association [ESA]), a trade association of the U.S. video game industry, was created. The IDSA proceeded to draft a proposal for a video game rating system. The proposal was accepted by the U.S. Congress in July 1994, resulting in the foundation of the ESRB in September of the same year. The earlier publisher-specific self-regulation practices—such as SEGA's Videogame Rating Council and the 3DO Rating System (both introduced in 1993)—were discontinued with the introduction of the industry-wide ESRB ratings.

Having undergone a number of revisions over the years, as of 2011, the rating system consists of six age-based categories: EC (Early Childhood, ages three and older), E (Everyone), E10+ (Everyone ten and older), T (Teen, ages thirteen and older), M (Mature, ages seventeen and older), and AO (Adults Only, ages eighteen and older). These are supplemented by over thirty content descriptors, such as "suggestive themes," "blood and gore," and "mature humor."

To initiate the rating process, the publisher is required to complete a detailed questionnaire, describing the content of the game in all relevant categories (including language, violence, sexuality, and substance use), and submit a video recording featuring typical gameplay as well as examples of the most extreme content. Following the controversy sparked by the "Hot Coffee" modification (which activated a nonexplicit sex-based minigame in *Grand Theft Auto: San Andreas* [2004]), the publishers are now also required to disclose any content that cannot be normally accessed by the players but is nevertheless present in the code of the final release. The submitted materials are reviewed by at least three anonymous raters, each of whom then submits an initial rating recommendation. Discussion follows until agreement is reached regarding the final rating recommendation. Following a parity examination, which ensures the consistency of ratings between different titles, an appropriate certificate and a rating summary are presented to the publisher. If the latter opts to revise and resubmit the game, the process is repeated from the beginning.

Although the ESRB rating system is strictly voluntary, unrated titles are usually not supported by game console manufacturers or carried by major retailers.

P. Konrad Budziszewski

See also: Censorship; Industry

Further Reading

Entertainment Software Rating Board website. Accessed October 11, 2020. Available at http://www.esrb.org.

Kent, Steven L. "Moral Kombat." In *The Ultimate History of Video Games: From Pong to Pokémon and Beyond*, 461–480. New York: Three Rivers Press, 2001.

U.S. Senate, Committee on the Judiciary, Subcommittee on Juvenile Justice and U.S. Senate, Committee on Governmental Affairs, Subcommittee on Regulation and Government Information. *Rating Video Games: A Parent's Guide to Games. Joint Hearings before the Subcommittee on Juvenile Justice of the Committee on the Judiciary and the Subcommittee on Regulation and Government Information of the Committee on Governmental Affairs, United States Senate, One Hundred Third Congress, First Session*. Washington, DC: U.S. Government Printing Office, 1995.

Environmentalism

Video games arose during the late 1960s and 1970s around the same time as the growth of environmentalism; however, their technological basis and digital and virtual nature did not make them likely candidates for involvement in the Green movement, so it was some time before the two found a connection. Today, however, they can be connected to the Green movement in two ways: through their form (because they consume energy) and through their content (which can be designed to teach and encourage Green ideas and practices).

As electronic devices that consume energy, home video game console systems should be turned off when not in use. A 2008 report from the Natural Resources Defense Council reported that many game consoles are left on continuously, and that more than 11 billion kilowatt hours a year of wasted energy, costing consumers over $1 billion, could be saved by turning them off (Horowitz 2008). According to the report, of the three seventh-generation consoles, the Nintendo Wii uses the least energy at 16 watts, whereas the Microsoft Xbox 360 uses 119 watts and the Sony PlayStation 3 uses 150 watts. Sony does feature an online update that helps power management in the system, and both the Xbox 360 and the PlayStation 3 have auto-shutdown modes; however, these have to be enabled by the user.

Some companies have designed their systems to be energy efficient. San Diego–based Zeebo Inc. has produced the Zeebo console, which is aimed at consumers in emerging markets in Brazil, India, China, and Mexico, and it only uses one watt of power, making it by far the most power-efficient contemporary system. Packaging is another area in which costs to the environment can be reduced. Like the music industry, some games companies have reduced the amount of packaging surrounding their products, and online distribution of games has eliminated the need for packaging altogether.

Games can also encourage the Green movement by teaching and embodying environmentalist ideas in an interactive, educational format. Some of the earliest games that could arguably be connected to the Green movement include *SimCity* (1989) and *SimEarth* (1990), which simulate environments and require players to manage resources to keep their cities and planets healthy. The design of *SimEarth* was even assisted by James Lovelock, the author of the Gaia hypothesis, which looks at a planet's organic and inorganic elements as one big self-regulating system. Since then, a number of games have contained green themes, such as *Awesome Possum . . . Kicks Dr. Machino's Butt* (1993), in which players collect recyclable bottles and answer questions about the environment, or *Oddworld: Abe's Oddysee* (1997), which is about environmental destruction. One can find Green games ranging from casual games, such as Nintendo's *Chibi-Robo Park Patrol* (2007) and National Geographic's *Plan It Green* (2009), to serious games, such as the urban-planning simulator *IBM CityOne* (2010) and Red Redemption's *Climate Challenge* (2006) and *Fate of the World* (2011).

An annual conference, EarthGames on Tap, hosted by the Center for Creative Conservation at the University of Washington, is building a community of people interested in environmentalist games. Other games, such as the experimental game *Flower* (2009), *Shelter 2* (2015), and *Walden, a game* (2018), also evoke Green themes in more subtle ways, causing players to consider the natural world and our effects on it.

Mark J. P. Wolf

See also: Contemplative Games; Zeebo

Further Reading

Aslinger, Ben. "Video Games for the 'Next Billion'?: The Launch of the Zeebo Console." *The Velvet Light Trap* no. 66 (Fall 2010): 15–25.

Horowitz, Noah. *Lowering the Cost of Play: Improving Energy Efficiency of Video Game Consoles*. November 2008. Available at https://www.nrdc.org/resources/lowering-cost-play-improving-energy-efficiency-video-game-consoles-2008.

Erikawa, Keiko (1949–)

Keiko Erikawa cofounded Koei Co., Ltd., a company that develops, publishes, and distributes video games, in 1978 with her husband, Youichi Erikawa. Erikawa graduated from Tama Art University and started in entertainment, first drawing placards and other design work for television, where she met Youichi. Early in their relationship, Keiko tried to cheer up her husband and bought him a Sharp MZ, which was expensive considering their limited finances at the time. That inspired Youichi's dream of starting a game company, which he did with Koei, and it propelled Keiko into the role of producer and business manager. If Youichi wanted to make games, Keiko declared, then she would ensure that those games made money.

Koei's first game was *Nobunaga's Ambition* (1983). Youichi wanted to make payment for the first game optional. Keiko was having none of it and demanded a price tag. The game went on to win multiple awards and launched Koei as a historical strategy game maker in its early stages. It also helped to launch the career of Yoko Kanno, the musician for Koei's early games and now named an influential woman in Japanese media writ large. Indeed, Keiko Erikawa's influence on the game industry is strongly seen in two unique ways: she is a staunch supporter of her husband and company—earning herself and Koei a somewhat dogged reputation in their early years—and she is a strong advocate for women in the game industry.

One of Keiko's notable successes follows on her goal to attract and retain more women in game development. She saw a dearth of games for women, noting that most games were violent and about killing. Thus, to attract women to making games, she saw the need to create games for women. At the release of *Nobunaga's Ambition*, Koei only had one woman on staff. Keiko notes that, to diversify, they hired women with humanities backgrounds and taught them computer coding. Thus, Keiko helped to form Ruby Party, an all-woman development team within Koei-Temco, to develop games for women. *Angelique* (1994) was the first game released in the neo-romance genre and is foundational in forming what are now called *otome games*. Not only did Keiko help to establish a new genre of video game (and one that is gaining in popularity), she also connects the rise of otome games to attracting more women into science and engineering.

Throughout the many leadership positions that Keiko Erikawa has cycled in and out of in Koei-Temko, she has maintained a careful eye on the market and is credited with encouraging the development of *Gitaroo-Man* (2001), *Shaberu! DS Oryōri Navi: Marugoto Teikoku Hotel* (2007), *Opoona* (2007), and Koei's first massively multiplayer online role-playing game (MMORPG), *Apsaras* (2000), all critically and commercially successful games. Further, she had the foresight to bring Koei into online gaming through such projects as *Nobunaga's Ambition Online* (2003) and *Uncharted Waters Online* (2004). Throughout her time, her often direct communication style and dogged determination ensured that she saw opportunity regardless of the situation. In relating a story about Koei's collaboration with the long-running *Gundam* franchise, Bandai's Hisashi Koinuma relates the story in which Keiko Erikawa was talking with him at an event and declared, "Let's make a *Gundam* game." Thus, the *Dynasty Warriors: Gundam* series was started.

Keiko's success continues to this day; she is currently the chairperson of Koei-Temko and the senior managing director of Koyu Corp.

Jennifer deWinter and Carly A. Kocurek

See also: Japan

Further Reading

Lee, Anne. "The Story Behind the All-Woman Team Who Invented the Otome Genre." Vice, March 2018. Available at https://www.vice.com/en_us/article/

d3wjpv/all-woman-team-otome-angelique-ruby-party.

"Translation: An Interview with Keiko Erikawa, the Pioneer of Games Marketed toward Women." Karasu Corps, April 9, 2016. Available at https://karasucorps.wordpress.com/2016/04/09/translation-an-interview-with-keiko-erikawa-the-pioneer-of-games-marketed-toward-women/.

Esports

Electronic sports, or esports, are a subset of sports inspired by other sportive practices but specifically in the realm of video games. The main difference between esports and other sports is the presence of a virtual, rather than physical, playing field. Games associated with this kind of practice have, as such, a less involved physical component than sports at large (though player skill and execution still plays a major role), often compensated with a greater cognitive challenge. Many other terms and conventions from sports practices are found within it, however, with seasons, teams, and tournaments reminiscent of other organized sports along with game design concepts such as scores, rounds, or sets. Live esports events became increasingly popular with their online mediatization even before video platforms, with game replays of highly skilled players being shared and viewed directly in-game in Id Software's *DOOM* (1993) or *Quake* (1996). Their popularity further increased with such platforms as YouTube and Twitch.tv and eventually with appearances on traditional sports television channels. Major games, leagues, and events typically represent the most viewed content on Twitch, with frontliner multiplayer online battle arena (MOBA) games such as *League of Legends* (2009) and *Dota 2* (2013) and first-person shooters such as *Counter-Strike: Global Offensive* (2012) and *Overwatch* (2015). Eventually, esports garnered the attention of game developers and other video game–related businesses, such as computer manufacturers, which increasingly funded professional players, teams, and events and designed with competitive purposes in mind.

Competitive play in video games dates a long way back. There are accounts of *Spacewar!* (1962) competitions dating back to the early 1970s and high score systems in arcade cabinets in the latter half of the same decade. Even then, video games facilitated a "competitive space between each other" (Taylor 2012, 3) that attracted many players, whether in live environments together or in trying to beat other high scores on arcade games. While the organized form of teams and leagues now found in esports comes from very different traditions rooted in other sports, this early spark of competition remains in video games to this day. LAN systems allowed simultaneous multiplayer competition in new genres, such as first-person shooters and real-time strategy games, and with the arrival of the internet and its impact on video games, these kinds of competitions would diversify, grow, and globalize.

A *Counter-Strike: Global Offensive* eSports event taking place on October 27, 2018, in Moscow, Russia. (Roman Kosolapov/Dreamstime.com)

South Korea has historically had an important role in modern organized esports competitions, with joint initiatives between its government and major businesses, such as Samsung, as early as the year 2000. The country is renowned as an international hub for esports competitions and leagues, and its electronic athletes can reach levels of renown akin to athletes in traditional sports elsewhere in the world. This is due to many factors, including the fast adoption of communication technologies, the local culture of internet cafés and the communities built around them, and governmental and corporate support, combined with the aid of traditional media such as television (Taylor 2012, 18–21). The South Korean model of commercial and mediatized esports is recognized as a success similar to that of traditional sports, sharing much of the same strengths as well as weaknesses.

While organized professional esports derived much of the strategies of other well-established real-life sports to build an audience and mediatize the practice, many of the same problems of playing games for money have been encountered by electronic athletes. The pressure to perform is high, as only the best of the best can play in high-profile teams and events, be sponsored, or achieve popularity on online platforms such as Twitch—all of which constitute the athlete's livelihood. Many practice for hours every day at the risk of injury, a phenomenon not unheard of even in these virtual sports environments. Strained hands and repetitive stress injuries are not as extreme as some injuries that other athletes, such as football players, expose themselves to, but they are just as dangerous for the athlete's professional career and well-being.

The pressure to perform being similar to other sports, one of the solutions became similar as well: doping. Drugs to enhance focus, concentration, and coordination—otherwise used to treat illnesses such as attention deficit hyperactivity disorder (ADHD)—can effectively enhance the athlete's ability to perform, especially in the stadium environments in which some professional players play. Some leagues and events have moved to try to curtail this phenomenon, though many still lack explicit rules (or ways to enforce those rules) against doping. Issues present in online gaming and streaming also followed as the practices became professional, namely with hostility against diversity or "trolling." Online anonymity and culture, combined with the massive audiences these events and players bring, often create toxic environments in chat rooms or on social media that the athletes have to deal with, on an emotive level, on top of the physical strain of their extensive practice.

Not all is so bleak however, as this professional practice demands several different skills of players and lets them grow them in turn, a situation not unique to esports games but extremely important within them. From game mastery to tactical prowess, hand-eye coordination, or communication skills in stressful environments, the specific skills required and built upon differ from game to game, but the professional aspect adds several on top, regardless of the game. These electronic athletes must develop a certain professional attitude to their practice, a work ethic, and a capacity for organization. This kind of business savvy is important in other sports as well, though the presence of official agents may ease that side of things for the athletes themselves. An ability to self-promote and especially to build an internet presence is also invaluable in the digital environments of esports. Finally, according to Taylor (2012, 37–38), an important and often overlooked skill of playing video games is the embodiment of game knowledge by the player, the materiality of the game.

As Taylor states, the physical aspect of the game is often ignored, obscured behind its on-screen elements; however, an electronic athlete's body must indeed enact his or her knowledge, and that takes training as well. High-level players, she states, sometimes mention an altered state as they play, in which they are "in the zone," where the player's body becomes in sync with the game. With this practice, the actions required by the game become inscribed in the player's body through muscle memory, which allows the top real-time strategy players to be analyzed through their "actions per minute," literally the number of commands they can issue in the game within a minute. Electronic sports, then, are truly played on a virtual field but controlled by athletes' bodies, which are just as important to consider as part of the game, besides what is seen on the screen.

Finally, from an academic perspective, the object that is esports as a whole causes a variety of problems when one attempts to analyze or question it. From the global nature of the phenomenon, with high-level leagues in not just South Korea but around the world, to the breadth of games played professionally, to the amount of skills and information at work in a single game, there is much of the practice to tease apart and learn about. Taylor notes that the spectatorship element of video games, especially in esports, has not had the importance it should have in the field of game studies compared to how important it has been, historically, for video games, from yesterday's arcades and computer labs to today's stadiums and online arenas.

Ophélie Bernard

See also: South Korea; Sports Games

Further Reading

Adamus, T. "Playing Computer Games as Electronic Sport: In Search of a Theoretical Framing for a New Research Field." In *Computer Games and New Media Cultures: A Handbook of Digital Game Studies*, edited by J. Fromme and A. Unger, 477–490. Berlin, Germany: Springer, 2012.

Brock, T. "Roger Caillois and E-Sports: On the Problems of Treating Play as Work." *Games and Culture* 12, no. 4 (2017): 321–329.

Hamari, J., and M. Sjöblom. "What Is eSports and Why Do People Watch It?" *Internet Research*, 27, no. 2 (2017): 211–232.

Jenny, Seth E., R. Douglas Manning, Margaret C. Keiper, and Tracy W. Olrich, "Virtual(ly) Athletes: Where eSports Fit within the Definition of 'Sport.'" *Quest*, March 11, 2016. Available at https://www.tandfonline.com/doi/abs/10.1080/00336297.2016.1144517?journalCode = uqst20.

Parkin, S. "Winners Might Use Drugs: Does eSports Have a Doping Problem?" Eurogamer, April 8, 2015. Available at https://www.eurogamer.net/articles/2015-04-08-winners-might-use-drugs.

Ruvalcaba, O., J. Shulze, A. Kim, S. R. Berzenski, and M. P. Otten. "Women's Experiences in eSports: Gendered Differences in Peer and Spectator Feedback During Competitive Video Game Play." *Journal of Sport and Social Issue*s 42, no. 4 (2018): 295–311.

Taylor, T. L. *Raising the Stakes. E-Sports and the Professionalization of Computer Gaming*. Cambridge, MA: MIT Press, 2012.

Wagner, M. "On the Scientific Relevance of eSports." Presented at the 2006 International Conference on Internet Computing & Conference on Computer Games Development, Las Vegas, NV: ICOMP 2006, June 26–29, 2006.

Winkie, L. "The eSports Injury Crisis." Vocativ, May 31, 2016. Available at https://www.vocativ.com/323427/the-esports-injury-crisis/.

ESRB. *See* Entertainment Software Rating Board

Ethics. *See* Morality and Ethics

Europe (Central and Eastern)

Central and Eastern Europe is the region comprising the European countries of the former Soviet bloc along with Yugoslavia and Albania, which were nonaligned state socialist countries. Although a culturally and linguistically diverse area, the countries share a common history due to the profound effects of the Iron Curtain and the state socialist economic model in the formative years of video game cultures.

In the 1970s and 1980s, the region was lagging behind the West in the development of computer technology. At the same time, official imports of computers or consoles from the West were complicated by Western export embargoes and a lack of convertible currency to pay for the goods. Many hobbyists therefore individually imported or smuggled 8-bit micros from the West or purchased them on the black market. The platform of choice varied from country to country. By the late 1980s, the Commodore 64 dominated in Hungary, the 8-bit Atari in Poland, and the Sinclair ZX Spectrum in Czechoslovakia and the former Soviet Union. Do-it-yourself hardware tinkering was a widespread way of building peripherals (like joysticks) or even entire computers. In Yugoslavia, the Galaksija computer kit became particularly influential, with over ten thousand machines built (Jakić 2014).

Throughout the 1980s, a large portion of gaming took place in state-sponsored computer clubs, usually affiliated with educational institutions, youth organizations, or the paramilitary. Clubs allowed hobbyists and gamers to gather, exchange software, and work on collaborative projects. As copyright for software was rarely enforced at the time, most games—including foreign ones—circulated in pirated copies through efficient networks of informal distribution. Several cracker groups (collectives that remove copy protection from original copies of games) were active in the region, and some of them later joined the demoscene. Thanks to informal distribution, gamers in the region had access to Western games but without the original paratextual material, such as instruction manuals. The availability of pirated home computer software, along with state support for programming education, also explains why consoles were less popular.

Game development within the region usually began with amateur or semi-amateur efforts. Czechoslovakia, in particular, hosted a prolific homebrew scene, producing over three hundred preserved games in the 1980s (Švelch 2018). Local authors often started in the genre of text adventure games, where they had little competition from the West because of the language barrier. Many of these titles covered local topics or drew inspiration from local culture, such as *Vruće Ljetovanje* (*Hot Summer Vacation*, 1985), a Yugoslavian text adventure about a family preparing for a summer vacation on the Dalmatian coast. The more economically liberal countries like Yugoslavia and Poland were already hosting fledgling domestic software markets in the mid-1980s. Czechoslovakia, on the other hand, produced some of the earliest examples of political protest games.

In the 1980s, Central and Eastern Europe established itself as a source of cheap labor and skilled talent to be utilized on the Western markets. In Poland, the P. Z. Karen studio (publishing under the label California Dreams) created a string of successful games for the Western audiences, including *Street Rod* (1989). In Hungary, a company called Novotrade produced a range of games, including *Caesar the Cat* (1983) and *Ecco the Dolphin* (1992). Lesser known is the case of the Yugoslavian programmer Duško Dimitrijević and his colleagues, who had three games—*Kung Fu* (1984), *Movie* (1986), and *Phantom Club* (1988)—published in the United Kingdom. The best-known game from the region is undoubtedly *Tetris*, designed by Alexey Pajitnov in 1984, initially for the entertainment of his colleagues at the Soviet Academy of Sciences in Moscow. It was later discovered in Hungary by a representative of Andromeda Software, Novotrade's British publisher, who began licensing it to other Western publishers (Ackerman 2016). *Tetris* was one of the few games that were explicitly marketed as products of the region. Some of the Western editions even exoticized the game by using the Cyrillic alphabet or adding images of Russian landmarks.

As the Cold War ended around 1989–90, the region rejoined the global hardware and software markets, but informal distribution continued to play a major role throughout the 1990s. As game development was growing more expensive and complex, regional productions initially lagged behind the West because of the lack of investment funding, managerial experience, and connections to major international publishers. At first, many local companies addressed the local markets, writing, for example, point-and-click adventures in the local languages, such as the Polish *Teenagent* (1995) by Metropolis software, which was also published in Czech. Other titles found success on the European PC games market, such as the Russian role-playing game (RPG)/real-time strategy hybrid *Rage of Mages* (1998). At the same time, several publishers, such as CD Projekt in Poland, specialized in localizing Western games (Krawczyk 2015). Local gaming magazines such as the Czech *Score* and the Polish *Secret Service* thrived until the widespread adoption of the internet.

During the 2000s and 2010s, a wide range of developers started to make impact internationally. In Poland, CD Projekt Red is responsible for the *Witcher* series (2007–15) and Techland for the zombie games *Dead Island* (2011) and *Dying Light* (2015). Czech developers produce the *ArmA* series (since 2006, including the *DayZ* spin-off) and started the *Mafia* franchise in 2002. Croatia-based Croteam has published a roster of titles including the FPS series *Serious Sam* (since 2001) and the puzzle game *The Talos Principle* (2014). Overall, European Union member states offer better access to Western markets and international talent, as well as a more stable business environment, but game development thrives outside of the European Union, too. The multiplayer online battle game *Word of Tanks* (2010) is produced by the Belarusian studio Wargaming, while the *Metro* series (2010–present) of first-person shooters is developed by 1C Games, originally based in Ukraine. Both companies have, however, moved their headquarters into the European Union (to Cyprus and Malta, respectively). At the same time, the Ubisoft multinational has opened studios in Sofia, Bulgaria, and Bucharest, Romania, both of which are within the European Union but offer lower labor and operational costs than Western Europe. Similarly, outsourcing has been the bread and butter of many regional companies (Ozimek 2019).

The region is also home to smaller independent studios, many of them creating original or quirky games. Poland's 11 Bit Studios has gained critical acclaim for *This War of Mine* (2014), a survival game inspired by the siege of Sarajevo. In Russia, Icepick Lodge has attracted a cult audience for its uncompromising artistic vision in games such as *Pathologic* (2004) and *The Void* (2007). Moreover, two runaway indie hits of 2019 came from the region, Triternion's multiplayer medieval melee game *Mordhau* from Slovenia and Beat Games' virtual reality (VR) rhythm game *Beat Saber* from the Czech Republic.

All in all, today's Central and Eastern European game development is too diverse to make general claims, but most of it follows the regional tradition of more open-ended and rough-around-the-edges PC gaming rather than the polished console production commonly associated with Japan and the United States.

Jaroslav Švelch

See also: Czech Republic; Germany; Hungary; Poland; Romania; Russia

Further Reading

Ackerman, Dan. *The Tetris Effect: The Game That Hypnotized the World*. 1st ed. New York: PublicAffairs, 2016.

Jakic´, Bruno. “Galaxy and the New Wave: Yugoslav Computer Culture in the 1980s.” In *Hacking Europe: From Computer Cultures to Demoscenes*, edited by G. Alberts and Ruth Oldenziel, 129–150. London: Springer, 2014.

Krawczyk, Stanisław. “‘You Must Gather Your Party before Venturing Forth’: Why Did Computer Games from around 2000 Become So Important in Poland?” In *New Perspectives in Game Studies: Proceedings of the Central and Eastern European Game Studies Conference*, edited by Tomáš Bártek, Jan Miškov, and Jaroslav Švelch, 9–26. Brno, Czech Republic: Masaryk University, 2015.

Ozimek, Anna M. “Outsourcing Digital Game Production: The Case of Polish Testers.” *Television & New Media* 20, no. 8 (May 2019): 824–835.

Švelch, Jaroslav. *Gaming the Iron Curtain: How Teenagers and Amateurs in Communist Czechoslovakia Claimed the Medium of Computer Games*. Game Histories. Cambridge, MA: MIT Press, 2018.

Europe (Western)

When the first video games were launched, Western Europe was divided from Eastern Europe during the Cold War (1945–91). Eastern Europe, including the Soviet Union, was far behind not only technologically but also in its mentality. Eastern Europe was mentally locked in a time stasis of a Marxist industrial society and consequently less able to comprehend or develop new ideas for art and entertainment in a postindustrial society. During the Cold War, this divide grew wider, and even today, we find a division in Europe between former Soviet vassals and Western Europe.

Video game history is closely related to the history of computing technology. British mathematician Alan Turing, a pioneer in this area, worked on software for the Manchester Mark I computer in the late 1940s and early 1950s. It was at this time, while working with his former undergraduate colleague D. G. Champernowne, that he began writing a chess program. The chess program was made for a computer that did not even exist at the time, and lacking the necessary computer power, it was only presented by Turing simulating the computer and taking about half an hour per move.

It was not until the 1970s that Europeans really tried taking up the challenge of combining computers and games. At this time, the Americans had already moved forward with games like *PONG* (1972). The Magnavox Odyssey was imported to the United Kingdom in 1973 and twelve other European countries in 1974. Many obscure European game systems appeared from 1974 into the late 1970s, such as the British VideoSport MK2, the German Interton Video 2000, and the French Lasonic 2000, all of them inspired by the Magnavox Odyssey and the system’s relatively simplistic game mechanics.

In February 1980, the British inventor Clive Sinclair launched the ZX80, which was followed up by the much more popular ZX81 and, later, the ZX Spectrum in 1982. The ZX Spectrum had sound and eight-color graphics and came in two versions, either 16 kilobytes or 48 kilobytes, and it turned out to be a very popular game machine. During the early and mid-1980s, Sinclair Computers had a vast share of the European game computer market, but at the end of the decade, the venture ended due to a lack of invention, poor strategy and marketing, and, consequently, low sales. Most of the games for the ZX Spectrum were inspired by arcade-style gaming, although adventure games and strategy games were also made.

Some prominent video game designers came from designing board games and role-playing games (RPGs). In 1975, Ian Livingstone and Steve Jackson founded the Games Workshop and made innovative games, creating *Warhammer Fantasy* (1983) and *Warhammer 40,000* (1987), which worked as inspiration for Blizzard's *Warcraft* (1994), *StarCraft* (1998), and *World of Warcraft* (2004). A series of Warhammer games were released during the late 1990s, and *Warhammer Online: Age of Reckoning* was released in 2008.

During the 1980s, Livingstone worked for Domark, which later merged with Eidos. In 1987, Les Edgar and Peter Molyneux founded the British video game company Bullfrog Productions, which made innovative games such as *Populous* (1989) and *Dungeon Keeper* (1997). In 1995, Electronic Arts (EA) acquired Bullfrog Productions, and in 1997, Peter Molyneux, together with Steve Jackson, founded Lionhead Studios, creating games such as *Black & White* (2001), *Fable* (2004), and *The Movies* (2005).

The Western European video game industry has been dominated by the big distribution companies in Britain and France. The British company Eidos (known for publishing *Tomb Raider* [1996], *Thief* [1998], *Commandos* [1998], *Hitman* [2000], and *Deus Ex* [2000]) and the three French distribution companies Vivendi, Ubisoft, and Atari (formerly Infogrames) comprise the influential distribution companies in Europe. The two biggest distribution companies, SCi (founded in 1988) and Eidos (founded in 1990), merged in 2005 when SCi acquired Eidos. In 2009, the Japanese company Square Enix purchased Eidos, changing its name to Square Enix Europe.

Founded in 1983 by Bruno Bonnell and Christophe Sapet, Infogrames became a success by not only distributing games but also designing games based on European comic books. The company acquired GT Interactive in 1999 and Hasbro Interactive in 2001. Hasbro Interactive owned rights to Atari, and a few years later, titles were sold under the widely known Atari brand. Via their Hasbro connections, they launched licensed *Dungeons & Dragons* games, such as *Dungeons & Dragons Heroes* (2003), *Neverwinter Nights: Hordes of the Underdark* (2003), and *The Temple of Elemental Evil: A Classic Greyhawk Adventure* (2003). In 2008, Infogrames completed its acquisition of Atari, Inc., making it a wholly owned subsidiary, and the official name was changed to Atari in May 2009. At the end of 2009, the company was struggling with great losses despite having produced famous games such as *Alone in the Dark* (1992), *Rollercoaster Tycoon* (1999), and *Civilization III* (2001).

Ubisoft was founded in 1986 by five brothers of the Guillemot family. Ubisoft started out as the distribution arm of MicroProse and EA and was soon engaged in distributing games for the United Kingdom and Germany as well. It has been involved with titles such as *Rayman* (1995) and the spin-off *Raving Rabbids* (2006), *Prince of Persia: Sands of Time* (2003), *Far Cry* (2004), *Just Dance* (2009), the *Tom Clancy* video game series, and the *Assassin's Creed* video game series. The company also committed itself to online games with its involvement with *Uru: Ages beyond Myst* (2003), *The Matrix Online* (2005), and the European and Chinese operation of *EverQuest* (1999). In 1999, Ubisoft cofounder Michel Guillemot founded the French video game publishing company Gameloft, which was acquired by Vivendi in 2016.

Compagnie Générale des Eaux began in 1853 as a water company. More than a century later, in 1998, the company had the name Vivendi Games. Since then, it has played a major role in video game distribution in Europe with games from Blizzard Entertainment, such as *World of Warcraft* (*WoW* [2004]). In 2008, Vivendi acquired 52 percent of Activision Blizzard, but five years later, Activision Blizzard purchased 429 million shares from Vivendi for $5.83 billion, dropping the shareholder from a 63 percent stake to 11.8 percent. Looking for a new partner in 2015, Vivendi was actively buying shares in Ubisoft and Gameloft, apparently trying to make a hostile takeover. By 2016, Vivendi had acquired Gameloft. As for Ubisoft, Vivendi reached 27.15 percent of the shares in December 2016, going for 30 percent to secure the hostile takeover. The hostile takeover, however, never took place, and in March 2018, Vivendi and Ubisoft came to an agreement, terminating any supposable takeover.

Lars Konzack

See also: Denmark; Finland; France; Germany; Iceland; Ireland; Italy; Netherlands, The; Norway; Portugal; Spain; Sweden; Switzerland; United Kingdom

Further Reading

Donovan, Tristan. *Replay: The History of Video Games*. East Sussex, UK: Yellow Ant, 2010.

Interactive Software Federation of Europe. "Video Gamers in Europe—2008." Nielsen Games, 2008. Available at https://ipk.nkp.cz/odborne-cinnosti/docs/ISFE_Consumer_Research_2008_Report_final.pdf.

Konzack, Lars. "Video Games in Europe." In *The Video Game Explosion: A History from PONG to PlayStation and Beyond*, edited by Mark J. P. Wolf, 203–210. Westport, CT: Greenwood Press, 2007.

Winter, David. "Video Games in Europe: The Early Years." In *The Video Game Explosion: A History from PONG to PlayStation and Beyond*, edited by Mark J. P. Wolf, 46–51. Westport, CT: Greenwood Press, 2007.

EVE Online

EVE Online is a science fiction–themed massively multiplayer online game

(MMOG) first released by Icelandic developer CCP Games in 2003 after five years in development. Celebrated for the scale and complexity of its player-driven world, *EVE* continues to be updated by regular expansions, with a respectable niche of close of a half million subscribers. Quite unlike many of the other MMOGs that were released around this time (such as *EverQuest* [1999] and *World of Warcraft* [2004]), *EVE Online* has a reputation of being notoriously difficult, with a hypercompetitive and ruthless culture in which theft and espionage are commonplace.

EVE pits players in a single virtual universe, commonly referred to as a “sandbox,” as players are free to choose the path they take in the game. Like other MMOGs, players have a persistent character identity that develops skills and can accumulate items and wealth, and they can join player groups (similar to guilds) called *corporations*. A sophisticated API system allows players to authenticate their identity with third-party programs, such as a corporation chat room, where much of *EVE*’s important social experience is played out. Unlike other MMOGs, *EVE*’s environment is not navigated in third person via a humanoid avatar but from the perspective of interchangeable spaceships with different capabilities, such as mining, transport, or different kinds of combat.

EVE can be extremely challenging to play, nicknamed *Excel Online* by players due to its complexity. Players do not respawn after being defeated in combat; their ships (and any items they were carrying) are permanently destroyed—turned into a wreck that can be salvaged by other players for a quick profit. Some of the largest and most powerful ships can be worth the equivalent of thousands of dollars, representing months if not years of in-game effort.

The imaginary world of *EVE* is a hypercapitalist, dystopic universe set far in the future in which rival non-player character (NPC) empires rule over “high-security” solar systems. In these systems, in-game police called CONCORD will destroy the ships of players who attack another player unprovoked. The slight delay in CONCORD’s response has led to emergent player events, such as “Hulkageddon,” where players flying cheap disposable ships team up to destroy, unprovoked, the expensive mining “hulks” of other players (see Bergstrom 2016). This type of interaction is characteristic of the aggressive and ruthless reputation that *EVE* has developed since its release.

Approximately a third of the solar systems in the *EVE* universe has no NPC presence, and player groups can claim sovereignty and build upgrades (such as space stations, where players can safely dock and trade), providing access to vast in-game wealth and power. CONCORD does not protect players there; they can be attacked at any time. Smaller corporations band together into alliances and coalitions of tens of thousands of players around the world to take and defend this territory.

Wars between these virtual nations are fought aggressively, going on for months, with battles occurring 24/7, requiring alliances to have members from around the world. Fights typically involve two hundred to three hundred players on either side, with the most crucial battles exceeding fifteen hundred combatants. As CCP Games does not prohibit the exploitation of misplaced trust in *EVE,* scamming and spying are pervasive. Long-term scams have seen the equivalent of hundreds of thousands of dollars’ worth of in-game items stolen from corporations, and as many wars are won by the act of spies and turncoats as they are by battles being won.

The *EVE Online* Monument, built to honor the game's players, which stands in the harbor of Reykjavik, Iceland. (Rndmst/Dreamstime.com)

This emergent, player-driven conflict is one of the most celebrated aspects of *EVE* and a large part of why the game has retained a persistent appeal, as players must bring their own meaning to the choices they make about how and why to play. There are even two popular books on these player-run *Empires of EVE* by game journalist Andrew Groen.

Developer and publisher CCP Games is based in Reykjavik, Iceland, and was founded in 1997 by ex-employees of OZ.com, an internet company that was attempting to develop a 3-D web browser. CCP Games was purchased by the Korean-based studio Pearl Abyss for USD 425 million in late 2018. Before this, CCP ambitiously tried to develop other games that tied into the *EVE Online* universe, such as a first-person shooter game *Dust 514* (launched in 2013 and shut down in 2016), and *EVE: Valkyrie* (2016), a first-person virtual reality (VR) flight simulator.

Marcus Carter

See also: Massively Multiplayer Online Role-Playing Games

Further Reading

Bergstrom, K. "Imagined Capsuleers: Reframing Discussions about Gender and EVE Online." In *Internet Spaceships are Serious Business: An EVE Online Reader*, edited by M. Carter, K. Bergstrom, and D. Woodford, 148–163. Minneapolis: University of Minnesota Press, 2016.

Groen, A. *Empires of EVE*: *A History of the Great Wars of EVE Online*. Seattle, WA: Lightburn Industries, 2016.

EverQuest

EverQuest (1999) is a massively multiplayer online role-playing game (MMORPG) originally developed for the PC by Verant Interactive and 989 Studios and published by Sony Online Entertainment; a Mac version of the game was released in 2003. *EverQuest* boasts a high-fantasy environment and provides players myriad choices in character creation and gameplay styles. Upon initial release, players could select a minimally customizable avatar from twelve distinct races and fourteen different playable classes. Both playable races and class options have increased in number to sixteen through various expansions; however, not all race and class combinations are available for selection (e.g., you cannot create a gnome shaman, an ogre wizard, or other pairings that may be incompatible with the game's lore). Players also have a host of deities to select from, dependent upon avatar race, and this added dimension can impact specific items and armor players are able to use as well as whether their characters are viewed as good, evil, or neutral within *EverQuest*'s massive world of Norrath.

To defeat enemies, acquire loot (in-game items and currency), and generally progress within the *EverQuest* universe, well-balanced player groups are required. Often, many groups of players must work together simultaneously, commonly referred to as a "raid," to defeat very powerful foes. While there is the ability to play as an individual, or "to solo," to some degree, *EverQuest* is largely built upon the spirit of teamwork and the thoughtful creation of well-balanced player groups. Ideal groups are composed of an intentional combination of role-based classes falling into four main categories: casters (enchanters, magicians, necromancers, and wizards); priests (clerics, druids, and shaman); melee fighters (berserkers, monks, rogues, and warriors); and hybrid characters (bards, beastlords, paladins, rangers, and shadow knights). Casters tend to provide damage-dealing capabilities, priests are adept at healing other players, melee characters can sustain damage more effectively and dish out damage at close range, and hybrid characters provide a combination of damage-dealing and damage-mitigation skills, often through unique and different means.

A basic party is limited to six players and typically includes a tank (a melee character who intentionally endures damage from the target enemy or enemies), a healer (someone to undo damage done to other players), and a combination of damage-dealers (often referred to as DPS, an initialism meaning "damage per second") and other supporting hybrid characters. Nearly all character types provide some type of benefit to other players, referred to as "buffs," with some player classes, such as bards and shaman, truly excelling in this area. Classes can also "debuff" targets (hostile creatures, monsters, and raid bosses) to increase the likelihood of victory in any given encounter. Debuffs can increase a target's susceptibly to specific damage types, lower attributes such as strength or armor class, and are often compulsory for those seeking victorious outcomes. Bear in mind that this is a very basic overview of how classes and groups are structured within *EverQuest*. There are many exceptions to these generalities, which are especially contingent upon the moment one chooses in the continuum of the past twenty years, given the dynamic nature of *EverQuest*'s updates, patches, and overall evolution.

As previously mentioned, raid-style encounters require several well-balanced groups of players to operate in concerted flawlessness. Deep levels of planning and group coordination are mandatory, and even an individual mistake by a single player can spell doom for a group or group of groups. Upon *EverQuest*'s release, there were no limits as to how many players could team up in attempts to take down powerful foes, and high-profile targets such as dragons and deities were not instanced (i.e., existing in a closed environment available only to those players who started a given dungeon or encounter). Instanced encounters are the standard in today's MMORPGs, but the lack of instancing in early *EverQuest* meant that the guild (a team of players operating as a team) or group(s) of players who raced to and engaged a target first could claim the spoils of victory, provided they had sufficient healing, damage, strategy, and (perhaps) luck. Many a squabble broke out over who "owned rights" to a particular target, and these arguments often spilled out of Norrath and into online forums and chat rooms. Given the limitations of dial-up internet connection speeds and graphics processing prevalent at the turn of millennium, latency-related issues often complicated encounters as scores of players grouped into small and compacted virtual spaces in search of loot and treasure.

Over the past twenty years, Sony Online Entertainment has made sweeping changes to *EverQuest* through the release of an impressive twenty-five expansions.

Nearly all aspects of the game have evolved since its 1999 release, including countless adjustments to gameplay, graphics, and quest-related content. One major change relates to how maximum player raids were reduced over time to the current cap of forty-two players (i.e., seven groups), thus making it more feasible to coordinate large-scale events. New servers were created to recapture some of the original experience that *EverQuest* offered, and players were given the opportunity to start afresh. Although a subscription-based model was employed upon its initial release, players can now immerse themselves in *EverQuest* and its first eighteen expansions free of monthly charge.

Original, or "vanilla," *EverQuest* is still popular with MMORPG fans, but the player-base is far smaller than the glory days of the early 2000s. There is a thriving emulation community that supports both nostalgic players pining for that vanilla experience and those seeking to modify Norrath beyond recognition. There are a variety of official pay-for options players may select from as they seek to traverse Norrath, a stark contrast to the early days of *EverQuest* whereby eBay-based cash-for-in-game-item trading was strictly forbidden. In its infancy, *EverQuest* was plagued with cash-for-items scandals, yet its producers sought to legitimize financial transactions on certain servers and through different means. For example, in 2002, the short-lived "EverQuest Legends" server charged $39.95 per month for access to an instantiation of *EverQuest* with additional features and exclusive content. The battle between players deeming pay-for transactions as cheating versus those who embraced the convenience still rages through the online gaming community. Even mobile apps and console games are often dubbed "pay-to-win." This branding can occur whenever exclusive, beneficial content is limited to those who are willing to pay for it rather than through earning it via game mechanics or what is often perceived as the application and performance of game-based skills.

EverQuest II was released on November 9, 2004. This sequel was positioned as direct competition for *World of Warcraft*, which was released November 23, 2004, and *World of Warcraft* arguably remains the dominant MMORPG to this day. However, a single *World of Warcraft* gameplay session highlights countless ideas borrowed from the original *EverQuest*. Many of these gameplay concepts were improved upon for more modern gaming audiences; however, the import of the original remains clear to this day. Other *EverQuest*-related titles were subsequently released and still more were canceled while in development; none gained the notoriety or traction of the original.

Capturing the essence of such a fluid and seminal game is difficult at best, but much of *EverQuest*'s success can be attributed to Brad McQuaid (April 25, 1968–November 18, 2019). McQuaid served as a producer and lead designer on the original *EverQuest* and was known to make in-game appearances across Norrath in the guise of his avatar, Aradune Mithara, sporting his fiery sword and customary green plate armor. McQuaid went on to produce *Vanguard: Saga of Heroes* (2009–14) and laid the foundations for the upcoming MMORPG *Pantheon: Rise of the Fallen*. Both titles have a great deal in common with *EverQuest*, with the latter perhaps serving as a true and worthy successor to the late designer's vision.

Joseph C. DiPietro

See also: Massively Multiplayer Online Role-Playing Games

Further Reading

EQEmulator website. Accessed September 12, 2020. Available at http://www.eqemulator.org/.

EverQuest website. Accessed September 12, 2020. Available at https://www.everquest.com/home.

Pantheon: Rise of the Fallen website. Accessed September 12, 2020. Available at https://pantheonmmo.com/.

Project 1999 website. Accessed September 12, 2020. Available at https://www.project1999.com/.

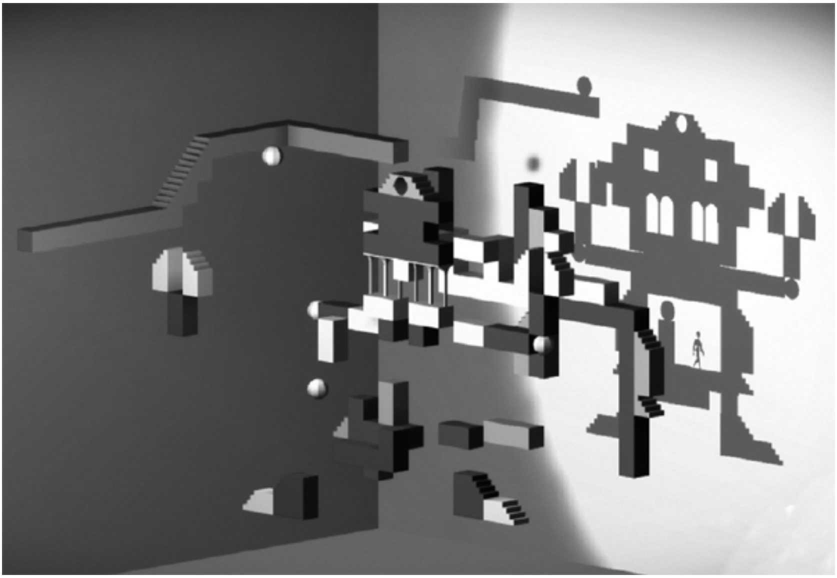
Public History Norrath: An Oral History of *EverQuest* website. Available at http://jhowardhistory.com/projects/public-history-norrath/.

ZAM *EverQuest* website. Accessed September 12, 2020. Available at http://everquest.allakhazam.com/.

Experimental Games

Experimental games are, by definition, games that experiment with something that has not been tried before in the area of software, hardware, gameplay mechanics, theme, or some combination of these. As all of these are constantly changing, historical context must be considered when judging to what degree a game can be considered experimental.

In their earliest days, many video games were experimental. Mainframe games often introduced new ideas and implemented new gameplay mechanics as mainframe computers developed. Early arcade games and home video games also introduced new concepts and ideas, with the most successful innovations inspiring a host of imitations. Many abstract games of the time, which often had idiosyncratic forms of gameplay, could arguably be considered experimental games, such as *Qix* (1981), *Quantum* (1982), and *Aztarac* (1983). Only after the establishment of video game conventions could the term *experimental games* take on the narrower meaning it has today, indicating a position outside of established conventions and, quite often, the commercial industry as well, because many experimental games are created as a part of artistic practice, similar to how experimental film and video exist alongside their companion industries (see also Art and Art, Video Games as).



A screenshot from SCE Japan Studio's *Echochrome II* (2010) which plays with three-dimensional objects and the manipulation of their two-dimensional shadows. (Courtesy of Mark J. P. Wolf)

Games created as artistic practice outside of the commercial industry arose along with the means to create them; in the late 1970s and into the 1980s, home computers brought the technical means for game creation to an audience beyond professional programmers (see Homebrew Games). Some of these games were original games, and others were game modifications of existing titles. Such games continued to be created in the 1990s, some using game engines originally designed for commercial games, and the trend continued into the 2000s, including such subgenres as "indie physics games" (Camper 2007, 198). With the appearance of the World Wide Web around 1993, web-based games became another venue for experimental game designers and one that could easily reach a larger audience. The web also made it easier for communities of experimental game designers and players to form, encouraging game production.

Experimental games include a wide variety of forms and content, sharing only a sense of innovation. Some artists are technologically experimental, such as Julian Oliver, whose game *levelHead* (2007) involves augmented reality (AR); other artists use simpler technology and explore how games can express the human condition, for example, Jason Rohrer's games *Passage* (2007) and *Gravitation* (2008). The study of game design in university programs promotes innovation, and some experimental games find their way to release for major game systems, such as *Echochrome* (2008) and Jenova Chen's *flOw* (2006; which began as an MFA thesis) for the Sony PlayStation 3 and *Abzû* (2016), *Keep Talking and Nobody Explodes* (2016), *What Remains of Edith Finch* (2017), and Chen's *Journey* (2012; PS4 version, 2015) for the Sony PlayStation 4.

Mark J. P. Wolf

See also: Contemplative Games; Dimen-sionality

Further Reading

Camper, Brett. “Independent and Experimental Games.” In *The Video Game Explosion: A History from PONG to Play Station and Beyond*, edited by Mark J. P. Wolf, 197–202. Westport, CT: Greenwood Press, 2007.

Schrank, Brian. *Avant-Garde Videogames: Playing with Technoculture*. Cambridge, MA: MIT Press, 2014.

F

Failure

Games, in their classic form, define goals for players to attain and thereby indicate what constitutes success and failure for players. A player that accepts the goal will work toward success and away from failure, and this gives structure to the game experience. It is possible for players to fail in relation to both the game as a whole (winning and losing) and on a smaller moment-to-moment scale, such as when a game punishes players for failing to complete smaller tasks. Failure always comes with a cost—a small delay in reaching a goal, lack of access to a resource, lack of progress, a loss of time invested, GAME OVER, or emotional or social costs.

Yet, what does it mean to fail in a game? The world is full of ongoing processes and systems, but for the vast majority of them, we do not feel that their outcomes reflect on us; we feel no personal responsibility for the weather and thus do not feel that rain, for example, represents a personal failure on our part. To say that we have failed in a game therefore requires that we accept and feel an emotional attachment to the game outcome (Juul 2003), accepting that some possible outcomes are preferable for us. We colloquially refer to this as a *goal*. The outcome of a game is often a simple number (the score in an arcade game or board game like *Carcassonne* [2000]) or a binary success/failure state. To say that we fail is to assume and accept that these outcomes reflect on us.

Game-defined goals can be both defined and enforced by the programming of a video game and enforced socially in an analog game. Furthermore, games can be more or less amenable to letting players define their own goals (Juul 2007). In practice, failure can be quite similar regardless of whether the goal is game or player defined. In analog or open-ended digital games, the game and its goals are determined and upheld by players, and even a strongly goal-driven digital game requires some kind of player acceptance of the goal. In short, while a game may enforce a goal more or less strongly, the experience of game failure always hinges on the player (or the social context around the player) accepting the importance of a given goal.

Because playing involves accepting the possibility of failure, failure is personal and thereby motivating in a positive sense. It is a moment of recognizing that we are not good enough, that we as players are lacking in some fundamental way, and that we, through lack of planning, skills, or even luck, failed to bring about the outcome that we had accepted as success. As a consequence, failure is a moment of reckoning, where we are given the opportunity to reconsider our strategies (Weiner 1985). Compare this to success, which can breed complacency. Failure shows that *we* matter, that there is a role for us to play.

The large philosophical question concerning game failure is this: is failing at a game the same as a failing in a nongame context, or is game failure special, for example, by being harmless? We can compare this to the general discussion of painful art (Smuts 2007). The best answer may be that game failure is defined by its ambiguity: games are an area where we can toy with different possible interpretations of failure (Juul 2013).

In a historical perspective, classic game form was mostly based on predefined criteria for success and failure, whereas some video games (such as flight simulators and other simulation games, such as *SimCity* [1989] and *The Sims* [2000]) began to experiment with letting the definition of success and failure be up to the player. Following that, recent experimental games, such as walking simulators, forego the possibility of failure at all and structure the game experience around other principles, such as narrative structure (e.g., *Dear Esther* [2012] and *Gone Home* [2013]) or open-ended poetic exploration (e.g., *Proteus* [2013]). It is possible to interpret such games as criticisms of the role of failure in traditional games and as an alignment with art practices (Carbo-Mascarell 2016).

So far, this discussion has centered on the nonfictional failure of players to achieve their goals. In most cases, any fiction of a game will mirror the player's actions such that a successful player will be mirrored by happy in-game characters, and any player failure will be mirrored by unhappy in-game characters. In this way, failure is associated with death in many game genres (Klastrup 2006). Conversely, it remains relatively rare for a game to ask players to succeed by causing a game protagonist to die or otherwise fail.

In short, failure is the dark underbelly of games, the moment of personal frustration and disappointment, a recurring event that proves that games are not simply fun but can represent and embody a wide range of experiences.

Jesper Juul

See also: Video Game Studies

Further Reading

Carbo-Mascarell, Rosa. "Walking Simulators: The Digitisation of an Aesthetic Practice." 2016. Available at http://www.digra.org/wp-content/uploads/digital-library/paper_66.pdf.

Juul, Jesper. *The Art of Failure: An Essay on the Pain of Playing Video Games*. Playful Thinking series. Cambridge, MA: MIT Press, 2013.

Juul, Jesper. "The Game, the Player, the World: Looking for a Heart of Gameness." In *Level Up: Digital Games Research Conference Proceedings*, Utrecht, Netherlands, Utrecht University, 2003: 30–45. Available at https://www.jesperjuul.net/text/gameplayerworld/.

Juul, Jesper. "Without a Goal: On Open and Expressive Games." In *Videogame, Player, Text,* edited by Barry Atkins and Tanya Krzywinska, 191–203. Manchester: Manchester University Press, 2007. Available at https://www.jesperjuul.net/text/withoutagoal.

Klastrup, Lisbeth. "Death Matters: Understanding Gameworld Experiences." In *Proceedings of the 2006 ACM SIGCHI International Conference on Advances in*

Computer Entertainment Technology. Hollywood, CA: ACM, 2006: 29. Available at https://doi.org/10.1145/1178823.1178859.

Smuts, Aaron. "The Paradox of Painful Art." *Journal of Aesthetic Education* 41, no. 3 (2007): 59–76.

Weiner, Bernard. "'Spontaneous' Causal Thinking." *Psychological Bulletin* 97, no. 1 (1985): 74–84.

Fairchild Video Entertainment System. *See* Fairchild/Zircon Channel F

Fairchild/Zircon Channel F

The Fairchild/Zircon Channel F was a second-generation (see Generations of Technology) video game console. Designed by Jerry Lawson and released in 1976 by Fairchild Semiconductor, it was the first cartridge-based home system. Originally named the Video Entertainment System (VES), it was renamed to Channel F following the release of Atari's Video Computer System (VCS).

Built around a Fairchild F8 CPU, operating at 1.76 MHz, the system included 64 bytes of main memory and 2 kilobytes of video memory. It could display graphics in eight colors (with up to four colors per line) at the resolution of 128-by-64 pixels (only 102-by-58 pixels were visible, however). Sound was produced through an internal speaker within the console itself. Hardwired into the base were two unique hybrid controllers, combining joystick and paddle functionality into a unified design. The system featured two built-in games: *Tennis* and *Hockey*.

Launched with the price of $169.95, the system was moderately successful during the 1976 Christmas season. However, it suffered a sharp drop in sales after the release of the superior Atari VCS the following year. To compete with the new contender, Fairchild redesigned the original model and released it as the Channel F System II. The new design sported a smaller, sleeker case, used removable controllers, and eschewed the internal speaker in favor of mixing the audio signal into the TV output. By that point in time, however, the market had been flooded with increasingly obsolete dedicated consoles that were being sold at a loss to clear surplus stock (see Crash of 1977). Unable to compete, Fairchild decided not to release the redesigned console and withdrew from the video game business altogether.

In 1979, the rights to the system and the entire unsold stock were acquired by Zircon International. The company released the System II in the United States and licensed it for European markets. It was sold in Sweden as the Luxor Video Entertainment System, in Great Britain as the Adman Grandstand Video Entertainment Computer, and in Germany as the Saba Videoplay and ITT TeleMatch Processor. Zircon also released a new production run of games first published by Fairchild as well as six original titles. All in all, twenty-six commercially released "videocarts" (cartridges) are available for the Channel F, some containing multiple games. Most of these were simple adaptations of traditional games, such as sports games (*Hockey* [1977], *Baseball* [1978], and *Pro-*

Football [1981]); card games (*Video Blackjack* [1976] and *Casino Poker* [1981]); board games (*Backgammon* [1977] and *Checkers* [1978]); puzzle games (*Maze* [1977] and *Memory Match* [1978]); and pencil-and-paper games (*Tic-Tac-Toe* [1976] and *Hangman* [1978]). The Channel F also received several clones of popular arcade games of the day, including *Desert Fox* (1976; based on Kee Games' *Tank* [1974]); *Space War* (1977; a *Spacewar!* [1962] derivative); *Lunar Lander* (1980; an adaptation of the arcade game by the same name); and *Alien Invasion* (1981; a *Space Invaders* [1978] clone). Perhaps the most original addition to the system's library was *Drag Strip* (1977), a racing game making use of the unique controller design to simulate a gear stick and throttle (with an eight-way joystick and rotary knob, respectively).

The system was discontinued in 1984 when Zircon withdrew from the video game business in the wake of the industry crash of 1983. In 2004, the system's demo videocart, from 1976, was discovered to have one of the earliest Easter eggs (Whalen 2012, 70).

P. Konrad Budziszewski

See also: Cartridges; Easter Eggs; Generations of Technology

Further Reading

Dyer, Clinton R., and Chris Webb. "Fairchild Channel F FAQ." *Digital Press*, May 25, 1997. Available at http://www.digitpress.com/faq/channelf.htm.

Edwards, Benj. "Interview with Jerry Lawson." *Vintage Computing and Gaming*, February 28, 2009. Available at http://www.vintagecomputing.com/index.php/archives/545.

Whalen, Zach. "Channel F for Forgotten: The Fairchild Video Entertainment System." In *Before the Crash: Early Video Game History*, edited by Mark J. P. Wolf, 60–80. Detroit, MI: Wayne State University Press, 2012.

Fallout Series

The *Fallout* games have always thematized humankind's inability to evolve past vital shortcomings in human nature and the never-ending strife for power and dominance. As science fiction dystopias, they involve players in desolate wastelands in which nuclear fallout has given way to unfamiliar and hostile ecosystems, where ideologies aim to realize their own, often blind and miscarried, dreams of Utopia. It is this mixture of visualizing the "imagination of disaster" (Sontag 1961) and "the potentially destructive and dystopian nature of human agency" (Domsch 2015, 407) that makes the *Fallout* games an ideal playground to explore "the deepest anxieties about contemporary existence" (Sontag 1961, 220). This traumatic experience—caused by the fear of the bomb in the aftermath of the Hiroshima and Nagasaki bombings in 1945 (Sontag 1961)—is wrapped into a playful trial action that satirically comments on empirical world issues, to not only exorcise these inner demons but also help players cope with them.

To outline this message, the *Fallout* games draw inspiration from the Cold War fears of the 1950s onward and extrapolate these into retrofuturistic scenarios where the bombs have fallen (Schulzke 2014, 10). They thus grant players an anarchical escape from their contemporary social order but also immerse them in strange yet somehow familiar worlds that induce players to critically rethink the relation between the fictional game world and their empirical surroundings. Set in a postapocalyptic United States, the games span over the years 2102 to 2287 and involve players in the roles of avatars (player characters) to explore a world without rules and to act out their unconscious desires. The main *Fallout* games are thereby set within open worlds and pertain to the role-playing genre (RPG): *Fallout: A Post Nuclear Role Playing Game* (Interplay Productions, 1997), *Fallout 2: A Post Nuclear Role Playing Game* (Black Isle Studios, 1998), *Fallout 3* (Bethesda Game Studies, 2008), and *Fallout 4* (Bethesda Game Studies, 2015). In addition, several spin-offs complement the series: the turn-based real-time RPG *Fallout Tactics: Brotherhood of Steel* (Micro Forté, 2001), the linear action game *Fallout: Brotherhood of Steel* (Interplay Entertainment, 2004), the open-world RPG *Fallout: New Vegas* (Obsidian Entertainment, 2010), the free-to-play (F2P) Vault simulation *Fallout: Shelter* (Bethesda Game Studios, 2015), and the online RPG *Fallout 76* (Bethesda Game Studies, 2018). Moreover, there are some analog games worth mentioning, such as the board game Monopoly: Fallout Collector's Edition (Winning Moves, 2015), Fallout: Pinball (Zen Studios, 2016), and the tabletop game Fallout: Wasteland Warfare (Modiphius Entertainment, 2017).

FALLOUT AND *FALLOUT 2*

The beginning of the series has its roots on the PC with the first two *Fallout* games from Interplay Productions (1997) and Black Isle Studios (1998). Inspired by games such as Interplay Productions' *Wasteland* (1988), *Fallout 1* and *2* are presented from an isometric point of view and pertain to the role-playing genre. Although they offer players an open world to discover at their leisure, movement is reduced to a point-and-click mechanic, and combat is turn based. In addition, the games introduce elements that will shape the series, such as branching dialogs, player choices that move the story in different directions, and the Pip-Boy 2000: a mechanical display strapped around the main character's arm to grant him (and players) access to world maps, objectives, game states, and so on. What is more, the S.P.E.C.I.A.L system allows players to distribute perks to individual points (strength, perception, endurance, charisma, intelligence, agility, and luck) to create the character of their choosing.

The plot of *Fallout* begins in 2161 and places players in the role of the Vault Dweller whose mission is to restore Vault 13's water purification system. However, additional threats soon emerge, including the Super Mutants, who are genetically modified beings that resemble Frankenstein's monster. Players dealing with the threat will be aided by the Brotherhood of Steel, a faction that is eager to accumulate technology and cleanse the wasteland of hostile creatures. As such, the game introduces a fundamental (ecological) theme to the series: the purification of nuclear pollution but also of humankind's unconscious urge to violence and the fear of the Other (with the Super Mutants representing the

Brotherhood's darkest selves).

Fallout 2 proceeds in a similar manner. Set in 2241, the game has players obtain the Garden of Eden Creation Kit (GECK), a terraforming device to restore withered parts of the wasteland. The Enclave are the major faction here. They claim to be the members of the former U.S. government and aim to restore order in a desolate world. In addition, they are involved in the Vault-Tec experiments; the vaults were not created to provide survivors with safe havens but to conduct social experiments on them: to design intentional flaws (e.g., having radiation leak in, which led to the society of Ghouls in Vault 12), to examine the effects of isolation or mixed-race tensions, and so on. Moreover, with *Fallout* 2, the series begins to ingrain culture references into the game world (such as allusions to George Orwell's *Nineteen Eight-Four* [1949] or Robert Wise's film *The Day the Earth Stood Still* [1951]) and steadily sets its satirical tone.

FALLOUT 3 AND *FALLOUT: NEW VEGAS*

With Bethesda Game Studios acquiring the *Fallout* trademark, the transition to the third dimension was a natural step for the series (employing the Gamebryo Engine, which was used for Bethesda Game Studios' *The Elders Scrolls: Oblivion* [2006]). *Fallout 3* (2008), released for PC and on Xbox 360 and PlayStation 3, still belongs to the genre of open-world RPGs, but it is shown from a first-person or third-person point of view. In addition, turn-based combat has given way to real-time shooting mechanics—although with the Vault-Tec Assisted Targeting System (V.A.T.S.), the original mechanics are retained but in adjusted form. Activated time slows down so that players can target individual body parts of opponents.

Notwithstanding these changes, *Fallout 3* confronts players with themes similar to those of its predecessors. Set in 2277, the main plot revolves around the Lone Wanderer who becomes involved in his father's work on water purification in the Washington, DC, area. The Enclave follow a different agenda with Project Purity, however. To cleanse the wasteland of mutated life-forms, they aim to poison its water reserves so that they may take power. Again, the fear of Otherness and the desire for dominance and power are foregrounded, which is complemented by a satirical tone that familiarizes players with nuclear fears.

In fact, *Fallout 3*'s central ethical problem revolves around an undetonated nuclear warhead situated in the midst of one of its major cities, Megaton. Opinions on the bomb differ, and one faction—called the Children of the Atom—even builds a religious cult around it. *Fallout 3* thus stands in the tradition of science fiction, such as Stanley Kubrick's *Dr. Strangelove or: How I Learned to Stop Worrying and Love the Bomb* (1964), which comments on Cold War anxieties by satirizing the treatment of the bomb: why fear it, when you can worship it. In contrast to the movie, players of *Fallout 3* may choose for themselves how to deal with the bomb (and other issues) and explore the gray moral outcomes of their choices.

It is easy to discern that player agency is of great importance to the *Fallout* games, and *Fallout 3* is probably the series' darkest game in this respect because players can freely determine their characters' ethical inclination. Similarly, Obsidian Entertainment's *Fallout: New Vegas* (2010), released on PC, Xbox 360, and PlayStation 3, is set in 2281 in the Mojave Desert and confronts players with four factions: the New California Republic, Caesar's Legion, Robert House, and Yes Man. Each of these groups pursues its own agenda, and players may choose with whom to side, whom to play, or whom to simply ignore all along. As a consequence, player choices move the story in ethically gray directions, with no good ending to the game. *Fallout: New Vegas* thus paints an utterly bleak and pessimistic picture of human nature by involving players in a game world that is governed by the survival of the fittest, thus foregrounding our selfishness, natural greed, and desire for power.

FALLOUT 4

Given the dystopian nature of its predecessors, it may come as a surprise that *Fallout 4* (Bethesda Game Studios, 2015) embarks on a more utopian route. The game was released on PC, Xbox One, and PlayStation 4 and is set in the Boston metropolitan area and surrounding Massachusetts, referred to as the Commonwealth. The game world is densely polluted, and vibrant colors and weather phenomena (such as radiations storms or deep mist) depict the Commonwealth as a destroyed yet picturesque environment where a fresh start seems imaginable. This regenerative appeal was never realized in previous games (probably intentionally) and transforms *Fallout 4* not simply into a warning of nuclear disaster but also into an experience that suggests ways to cope with it and move forward in different directions.

The game is set in 2287 (210 years after the Great War) and involves players in the role of the Sole Survivor, who embarks on a mission to search for his lost son. Players may choose a female or male character (mother or father), but the main focus soon shifts from the private sphere of the family to a societal struggle for Utopia. On their journey through the Commonwealth, players encounter memorable locations such as Diamond City (where people have found refuge form the surrounding dystopia), Abernathy Farm (a small, peaceful agricultural society), and Goodneighbor (a community of ghouls and criminals exiled from Diamond City). All of these seek help in different ways, and players may choose to intervene. In Diamond City, for example, a strange paranoia infests people's mind, making them believe they are being swapped by identical-looking Synths (artificial beings that are created by the ominous Institute). This thematic links *Fallout 4* to American science fiction films such as Don Siegel's *Invasion of the Body Snatchers* (1956) and foregrounds the game's satirical tone in conveying Cold War anxieties (particularly the fear of a hidden Communist invasion).

The Synth issue and fear of the Institute are widespread in the Commonwealth, and several factions have their own ideas of how to deal with the supposed threat and chart ways into the future. Whereas the nationalist Brotherhood of Steel regard them as dangerous (as things that do not deserve to live), the Railroad functions as the humanitarian opposite. In their attempt to save the Synths and hide them in safe houses until they are integrated into society, a clear connection to the real-world Underground Railroad (that helped African American slaves to escape to the North) from the mid-nineteenth century can be established. The Institute, on the other hand, pursues a different agenda.

They are the underground boogeyman of the Commonwealth and aim to replace the anarchical filth from above with artificial beings so that they can establish a society of scientists. Lastly, there are the Minutemen, a faction with clear references to the independently formed, eponymous militia in the American Revolutionary War. Their agenda is to restore order to the Commonwealth by establishing a network of egalitarian communities and dealing with the Raider threat.

All of these factions take inspiration from American history (but also create allusions to contemporary trends, such as the refugee crises in Europe) and urge players to create imaginative connections between both worlds. This also manifests itself in how players may deal with the factions, for whom they will conduct missions, with whom they will side, and eventually how they will decide which of these ideologies they deem best to control the Commonwealth. A particular utopian (or dystopian) energy is thereby placed on the creational aspects of the game. Players may choose to build a network of egalitarian settlements dispersed throughout the Commonwealth where people of all races and ethnicities are welcome. However, they may also choose to do nothing or spend the resources they encounter to create phallic symbols of power to fuel their selfish desires.

Gerald Farca

See also: apocalypse

Further Reading

Domsch, Sebastian. “Dystopian Video Games: Fallout in Utopia.” In *Dystopia, Science Fiction, Post-Apocalypse: Classics—New Tendencies—Model Interpretations*, edited by Eckart Voigts and Alessandra Boller, 395–410. Trier, Germany: Wissenschaftlicher Verlag Trier, 2015.

Farca, Gerald. *Playing Dystopia: Nightmarish Worlds in Video Games and the Player’s Aesthetic Response*. Vol. 8. Bielefeld, Germany: Transcript, 2018.

Schulzke, Marcus. “The Critical Power of Virtual Dystopias.” *Games and Culture* 9, no. 5 (July 2014): 315–334. Available at http://gac.sagepub.com/content/9/5/315.

Schulzke, Marcus. “Moral Decision Making in *Fallout*.” *Game Studies* 9, no. 2 (November 2009). Available at http://gamestudies.org/0902/articles/schulzke.

Sontag, Susan. *Against Interpretation and Other Essays*. New York: Picador, 1961.

Famicom. *See* Nintendo Entertainment System/Nintendo Famicom

Fandom

As an analytical term, *fandom* refers to the cultural domain of audiences that actively group around certain fiction, such as a game, novel, television series, or popular music and the products derived from them. Fandom based on such sources consists of various online and off-line communities, which have three defining features. First, fandom involves a highly interpretive community in which media products are analyzed and discussed. Second, these communities are also social communities in which individuals can establish relations with other aficionados. And third, fandom often involves a considerable creative function. Within fan communities, it is quite common for individuals to create their own stories (fan fiction) and artwork based on the sources they love. Other fans, in turn, read and evaluate these fan products.

The origin of the term *fandom* is rather unclear. Its earliest media citing appears in a sports column of the *Washington Post* on October 10, 1896. The word *fan*, in turn, is an abbreviation of *fanaticus* or *fanatic*, which has connotations of *fancy*, religious zeal, and overactive engagement. The popular imagery surrounding fans tends to depict the fan as deviant, tragic, narrow-minded, or violent (Bailey 2005; Jenkins 2006). Such negative images of fans have been circulating for some time. These were argued against by the first scholars of fandom (Jenkins 1992; Jenson 1992). Early studies of fans aimed to portray fandom not as deviant but as a creative and somewhat subversive lifestyle that is worth examining.

A cosplaying fan at Comic Con Bangalore. (Arunkumar Nambiar/Dreamstime.com)

The first traces of fandom as an institutionalized phenomenon can be found in the 1930s, when several literary fan clubs for the Sherlock Holmes novels were founded. In the 1950s, the institutionalization of fan practices continued with the founding of the first fan conventions: readers of science fiction would meet up in hotels to attend events, such as panels, where they could discuss the material with its creators or among themselves.

Although much has been written about the history of television fandom, the development of game fandom has scarcely been examined. Game fandom as such can be traced back to the 1970s, when the tabletop role-playing game (RPGs) Dungeons & Dragons (1974) was created and, along with it, a franchise. Players could, for instance, collect miniatures based on the game. Additionally, in the late 1970s, live-action role-playing (LARP) was founded. This practice originated directly from the fantasy fandom and was based on tabletop role-playing games and literature.

In the 1980s, video game fans started to program their own versions of video games, be it improvements, alterations, or entirely new games. With these game modifications, fans also boosted the development of video games. In this way, fans directly influenced the industry with their independent games or experimental games (Martin and Deuze 2009). In fact, the adventure game genre itself originated in the late 1970s and arose from enthusiasts' experiments on mainframe computers (e.g., Crowther and Woods's *Colossal Cave Adventure* [1976]) rather than from the industry (Aarseth 1997).

Game fans are also often active in practices that originated in other kinds of fandoms. For instance, fans derive stories from games, so-called fan fiction, which has been a dominant practice in television fandom since the 1970s. Similarly, video game fans create their own fan videos, which, in the case of video games, are called *machinima*. Lastly, fans can dress up as characters from video games or other media. This is called *cosplay*, short for *costume playing*, a form of performance that can be seen at many fan conventions, events, and meetings.

For some decades, fandom within all media was mostly limited to institutions such as conventions and fan clubs. In the 1990s, this changed when the World Wide Web became a communication platform. Through mailing lists, chat rooms, and message boards, it became easier to find other enthusiasts of a given series or franchise. Sites such as FanFiction.net (1998) were founded where fans could publish their fiction. At first, broadcasting networks perceived these fan activities as challenging terms of copyrights, and some corporations thus took legal action to stop fan activities. More recently, networks and other institutions have become rather tolerant of fan activities and even encourage them.

Although *fandom* as a term is restricted to fans of a certain media product, being a fan often takes place in a larger framework. Fan communities typically include a variety of participants. Some may be a fan of various franchises or series; others may be very keen on one product or on one specific game of a series. Many fans show an affinity with a certain genre (such as anime or science fiction) or with a certain lifestyle rather than with just one series. They may, for instance, describe themselves as a "gamer," "geek," or "otaku," the latter being a term that refers to fans of Japanese popular culture.

Contemporary studies of fandom face two notable challenges. First, with the recent emergence of fan communities as a mainstream part of the online environment, the view of fandom as a subculture is challenged. Whereas fans used to be an exception as a creative, active audience, the recent participatory climate online—sometimes described as Web 2.0—motivates all users to show, create, and upload their own content. Recent studies show how problematic it becomes to define fan practices when they blend with general online practices (Jenkins 2008) or youth culture as such (Ito et al. 2010). Second, fandom is a highly diverse phenomenon online and off-line. Fans make use of many platforms to discuss content and to upload their own fiction, art, and videos, including

YouTube, DeviantArt, Tumblr, and Twitch. For discussion, fans often use Reddit or chat channels such as Discord. The products of fandom can be found at various off-line sites, such as fan conventions, although a poster in one's office can just as well be a signifier of fandom. Fandom provides a prime example of an active audience, but it also challenges views of how online and off-line audiences operate in general.

Nicolle Lamerichs

See also: Social Media

Further Reading

Aarseth, Espen. *Cybertext: Perspectives on Ergodic Literature*. Baltimore, MD: Johns Hopkins University Press, 1997.

Bacon-Smith, Camille. *Enterprising Women: Television Fandom and the Creation of Popular Myth*. Philadelphia: University of Pennsylvania Press, 1992.

Bailey, Steven. *Media Audiences and Identity: Self-Construction in the Fan Experience*. New York: Palgrave, 2005.

Busse, Kristina, and Karen Hellekson, eds. *Fan Fiction and Fan Communities in the Age of the Internet*. Jefferson, NC: McFarland, 2006.

Hills, Matt. *Fan Cultures*. New York: Routledge, 2002.

Ito, Mizuko, et al. *Hanging Out, Messing around, and Geeking Out: Kids Living and Learning with New Media*. Cambridge, MA: MIT Press, 2010.

Jenkins, Henry. "Afterword: The Future of Fandom." In *Fandom: Identities and Communities in a Mediated World*, edited by J. Gray, C. Sandvoss, and Lee Harrington, 357–364. New York: New York University Press, 2008.

Jenkins, Henry. *Convergence Culture: Where Old and New Media Collide*. New York: New York University Press, 2006.

Jenkins, Henry. *Textual Poachers: Television Fans and Participatory Culture*. New York: Routledge, 1992.

Jenson, Joli. "Fandom as Pathology: The Consequences of Characterization." In *The Adoring Audience*, edited by Matt Hills, 9–29. New York: Routledge, 1992.

Martin, Chase Bowen, and Mark Deuze. "The Independent Production of Culture: A Digital Games Case Study." *Games and Culture* 4 (2009): 276–295.

Sandvoss, Cornel. *Fans: The Mirror of Consumption*. Cambridge, UK: Polity Press, 2005.

FarmVille

FarmVille is a real-time farm simulation game that builds on the multiplayer possibilities of social software, namely Facebook, and can be characterized as a social game and a casual game. The game was launched by Zynga in June 2009 and copied many of the features of an already existing *Farm Town* (2009) game by Slashkey. In 2010, *FarmVille* was made playable also on iOS and Android platforms. *Farmville 2* was released in 2012.

The game is about managing both the simulated farm, with crops, trees, and livestock, and the friendships that help in taking care of the farm. Neighboring friends' farms are accessible, and friends are able to help each other in different tasks and by sending gifts—such as decorations, animals, and trees—as these are sources of in-game currency and experience. Alongside succeeding in farming, the player can engage with the look of the farm, which can be customized with thousands of items that can be arranged in unique ways.

By 2010, *FarmVille* was the most popular application on Facebook, with a player base of more than eighty-three million monthly active users. The game's fast growth can be explained by the already existing networks on Facebook, as the game's status updates can be posted on a player's Facebook wall. Players can also easily invite their friends to be players. Furthermore, other Zynga games, including *Mafia Wars* (2009) and *Treasure Isle* (2010), cross-promote each other on their game websites. In late 2010, new tasks were added to *FrontierVille* (2010) that required specified success in *FarmVille* to complete.

FarmVille remained in a beta state for nearly two years, and the game's development is heavily based on player statistics and feedback. Both the mechanics of the game and the available objects are constantly changing. For instance, the players wanted to include a way to harvest more than one plot of crops at a time; such a feature was added to the game as a harvester that can be used to harvest several plots. One of the changing event-based features of the game is the inclusion of seasonal, often Northern American, cultural references, such as Thanksgiving and Valentine's Day decorations. Over the years, new features, such as weekly leaderboard, limited edition items, and the possibility of subscribing with a VIP membership ($10.00/month), have been added.

The various objects in the game can be purchased with Farm Coins or Farm Cash. Both virtual currencies can be gained through gameplay: Farm Coins through harvesting and selling and Farm Cash by gaining levels with experience points. Both types of currency are also available for purchase with real money. As of early 2018, the prices for Farm Cash (FC) vary from $1 for 4 FC to $100 for 650 FC (a decorative lake costs 56 FC, which is worth about $10). The currencies can be bought on the game website or as game vouchers in participating stores worldwide. Zynga has also engaged in in-game advertising with partners, such as 7-Eleven.

The game has also participated in fund-raising through special game items. After a major earthquake in Haiti in 2010, Zynga raised $1.5 million for a Haitian school by selling special nonwithering beet seeds and virtual school supplies. However, only 50 percent of the raised funds were used in charity, and some controversy has arisen around the type of charity work conducted. The game's success has also prompted a satirical response in the form of the game *Cow Clicker* (2010) by Ian Bogost, a game researcher and designer. Containing only its namesake activity, *Cow Clicker* mimics the allegedly simplistic gameplay of games such as *FarmVille*. Significantly, however, *FarmVille* paved the way for numerous similar incremental games that followed its success and remain popular.

Hanna E. Wirman

See also: Casual Games; Zynga Inc.

Further Reading

Burroughs, Benjamin. "Facebook and FarmVille: A Digital Ritual Analysis of Social Gaming." *Games and Culture* 9, no. 3 (June 19, 2014): 151–166. Available at https://journals.sagepub.com/doi/full/10.1177/1555412014535663.

Liszkiewicz, A. J. Patrick. "Cultivated Play: *Farmville*." *Berfrois,* October 21, 2010. Available at https://www.berfrois.com/2010/10/cultivated-play-farmville/.

Femininity

The video game industry is often perceived as having a mostly male environment and culture. For example, the most common stereotype associated with video game players is the teenage boy playing video games alone in his room. However, as video games became increasingly ubiquitous in households, and part of the daily routine of many players, the stereotypes associated with them have faded as well. According to the Entertainment Software Association (ESA) yearly report, the average gamer is thirty-four years old, and frequent gamers regularly play with friends (2018). Currently, adult women represent a greater portion of the population that plays video games than teenage boys. The same report indicates that the average age of frequent game purchasers is thirty-six, and 39 percent of these purchasers are female. As more and more women are involved in diverse aspects of gaming culture, the need to study how they engage with video games arises. Research focused on women and video games addresses three key aspects: females represented in video games, female video game players, and female video game developers (Heeter 2014).

The ways in which females are represented in video games often reflect how society conceptualizes femininity. The portrayal and behaviors of video game characters can potentially shape players' perceptions of gender roles in social groups (Heeter 2014). Consequently, female video game characters portrayed as damsels in distress perpetuate the role-related behavior of women as passive beings in need of rescue. Research also shows that representation of females in video games is consistently stereotypical, with women being sexualized or given secondary roles (Rutter and Bryce 2006). However, video games have gradually introduced strong and capable female lead characters, such as Samus Aran in the *Metroid* series, Faith Connors in *Mirror's Edge* (2008), and Jill Valentine in the *Resident Evil* saga.

One of the most notable female lead characters is Lara Croft, the protagonist of the *Tomb Raider* series. She was not only one of the first female video game protagonists, but she has also undergone changes in her appearance that have adapted to the evolution of how females are portrayed in video games. In addition, Lara Croft showed how women can be involved in traditionally masculine careers, and she also changed how femininity was represented in video games: she was the action hero, not the damsel in distress (Kennedy 2002). The modern Lara Croft portrayed in recent installments of the franchise also shows the evolution of the character, introducing a female lead that is no longer as sexualized as the first version.

Regarding women as game players, research shows that they are getting increasingly involved in gaming activities. Female video game players account for nearly 45 percent of gamers in the United States alone (“Essential Facts” 2018). When examining female video game players, discussion often focuses on the gender-specific differences in gaming preferences and behaviors. In their research, Royse and her coauthors avoided the idea that female players are easily categorized and stated that their preferences cannot be readily predicted. They noted that some women greatly enjoy first-person shooters (FPS), which are traditionally seen as inherently masculine, whereas other women prefer casual games such as *The Sims* (2000) (Royse et al. 2007). Instead, they examined the gaming preferences and experiences of adult women based on the frequency of play, the level of engagement, and genre preferences (Royse et al. 2007). They identified three types of female gamers: power gamers, moderate gamers, and nongamers. Power gamers play more frequently and tend to play multiple genres. In contrast, moderate gamers mostly play to cope with daily difficulties, as games provide a distraction from the stress of everyday life. Finally, nongamers voiced strong criticism about the gaming culture and devoting time to play video games. These women think that video games are a waste of time, and they prefer to spend their free time doing other types of activities.

Another area of female involvement in video games is development and careers related to the gaming industry. Female video game developers are still the minority. According to a survey by the International Game Developers Association (IGDA) conducted in 2017, only 21 percent of the respondents identified as being female (Weststar et al. 2018, 11). Other sources claim that female developers also make less money than male developers, suggesting that women make eighty-six cents on the dollar for every dollar men make (“Effect of Women” 2018).

Sadly, one of the most well-known incidents regarding female video game developers is Gamergate. Gamergate was an online movement that claimed to be concerned with ethics in game journalism, but in reality, it only resulted in the harassment of women in the gaming industry. The main targets of this incident were Zoë Quinn and Anita Sarkeesian. Quinn is a game developer who created the interactive fiction game *Depression Quest* (2013). In August 2014, a blog post by Quinn’s former boyfriend made allegations that she had slept with a video games journalist to secure a favorable review for her game. The harassment and threats against Quinn rapidly increased and quickly resulted in her home address as well as personal photos being shared on social media. Sarkeesian is the founder of Feminist Frequency, an organization that analyzes modern media’s representation of gender, race, and sexuality. She published a series of videos, *Tropes v. Women*, in which she examined many of the clichés and stereotypes perpetuated by video games, such as the role of the damsel in distress, women as background decoration, women as rewards, and lack of body diversity, among others. Both women received death and rape threats, and their personal information was publicly shared.

Fortunately, female developers now have more resources for professional development and support. For example, IGDA has a special interest group, Women in Games, that seeks to promote gender balance in the gaming industry. The website offers news and articles, a schedule of upcoming events and activities, and access to online communities that provide an open forum for discussion of a wide variety of issues, ranging from career development to workplace equality. Although there are many gaming conferences around the world, Games Week Berlin is notable because it features an event that highlights the participation of women in the gaming industry. One of their most important events is Womenize!, an action program with the main aim of promoting women in the games, media, and IT industry workplace. The event offers a conference program that addresses career building, leadership, job profiles, and women in esports and the gaming industry in general as well as recruitment, networking, and workshops on game development. The event is open to both genders, but the main focus is the recognition, empowerment, and support of women in the industry.

Video game culture and industry is still relatively young, and there is still much work to do to provide more diverse female representations in video games, more inclusive video game spaces for females, and better working environments for female game developers. However, some progress has been achieved toward equality in gender for game development and in the gaming culture itself.

Rita Santoyo Venegas

See also: Gender; Girls' Games; Masculinity

Further Reading

Cassell, Justine. "Storytelling as a Nexus of Change in the Relationship between Gender and Technology: A Feminist Approach to Software Design." In *From Barbie to Mortal Kombat: Gender and Computer Games*, edited by Justine Cassell and Henry Jenkins, 298–326. Cambridge, MA: MIT Press, 1998.

"The Effect of Women in Gaming." *Game Designing*, May 12, 2018. Available at https://www.gamedesigning.org/gaming/women/.

Egenfeldt-Nielsen, Simon, Jonas Heide Smith, and Susana Pajares Tosca. *Understanding Video Games: The Essential Introduction*. New York: Routledge, 2008.

Hathaway, Jay. "What Is Gamergate, and Why? An Explainer for Non-Geeks." Gawker, October 10, 2014. Available at https://gawker.com/what-is-gamergate-and-why-an-explainer-for-non-geeks-1642909080.

Heeter, Carrie. "Femininity." In *The Routledge Companion to Video Game Studies*, edited by Mark J. P. Wolf and Bernard Perron, 373–379. New York: Routledge, 2014.

"IGDA Women in Games." IGDA. Accessed September 13, 2020. Available at https://igda.org/sigs/women/.

Jenkins, Henry. "Complete Freedom of Movement: Video Games as Gendered Play Spaces." In *From Barbie to Mortal Kombat: Gender and Computer Games*, edited by Justine Cassell and Henry Jenkins, 262–297. Cambridge, MA: MIT Press, 1998.

Kennedy, Helen. "Lara Croft: Feminist Icon or Cyberbimbo? On the Limits of Textual Analysis." *Game Studies* 2, no. 2 (December 2002). Available at http://www.gamestudies.org/0202/kennedy/.

Lewis, Helen. “Gamergate: A Brief History of a Computer-Age War.” *The Guardian*, January 11, 2015. Available at https://www.theguardian.com/technology/2015/jan/11/gamergate-a-brief-history-of-a-computer-age-war.

Royse, Pam, Joon Lee, Baasanjav Undrahbuyan, Mark Hopson, and Mia Consalvo. “Women and Games: Technologies of the Gendered Self.” *New Media and Society* 9, no. 4 (2007): 555–576.

Rutter, Jason, and Jo Bryce. *Understanding Digital Games*. London: Sage, 2006.

Stuart, Keith. “Zoe Quinn: ‘All Gamergate Has Done Is Ruin People’s Lives.’” *The Guardian*, December 3, 2014. Available at https://www.theguardian.com/technology/2014/dec/03/zoe-quinn-gamergate-interview.

“2018 Essential Facts about the Computer and Video Game Industry.” Entertainment Software Association, 2018. Available at https://www.theesa.com/esa-research/2018-essential-facts-about-the-computer-and-video-game-industry/.

Webber, Jordan Erica. “Anita Sarkeesian: ‘It’s Frustrating to Be Known as the Woman Who Survived #Gamergate.’” *The Guardian*, October 16, 2017. Available at https://www.theguardian.com/lifeandstyle/2017/oct/16/anita-sarkeesian-its-frustrating-to-be-known-as-the-woman-who-survived-gamergate.

Weststar, Johanna, Victoria O’Meara, and Marie-Josée Legault. “Developer Satisfaction Survey 2017: Summary Report.” International Game Developers Association, January 8, 2018. Available at https://ir.lib.uwo.ca/mospub/42/.

“Womenize!” Games Week Berlin. Accessed September 13, 2020. Available at http://www.gamesweekberlin.com/womenize/.

FIFA Series

David J. Leonard observes that “the sports gaming industry is the crown jewel of the video games world” (2005, 110). It comes as no surprise that a sport as widely televised, watched, and played in the world as soccer played a meaningful role in the development and further popularization of digital gaming. Accordingly, as soon as programmers could program code to simulate a complex set of rules and some graphic elements to move across a playing field representing a soccer pitch, digital soccer games became available for most of the early digital gaming consoles and computers. The earliest soccer games included *Soccer* (1972) on the Magnavox Odyssey, *Pele’s Soccer* (1981) and *RealSports Soccer* (1983) for the Atari VCS 2600, and *International Soccer* (1983) for the Commodore 64. Commodore’s follow-up system, the Amiga 500, could load the popular game *Kick-Off* (1989) and its influential sequel *Kick-Off 2* (1990), and the Nintendo Entertainment System (NES) and the Gameboy provided *Nintendo World Cup* in 1990, a decisive year in digital soccer history, partly because of the real-life World Cup hosted by Italy in 1990 and the resulting awareness of soccer in global sports cultures.

However, although the real-life event of the World Cup in Italy may have stirred soccer excitement on the production and gamers’ side in the digital market, the first watershed moment in the history of digital soccer games came with the production and release of *Sensible Soccer* (1992) and its even more popular sequel, *Sensible World of Soccer* (*SWOS*, 1994) by Sensible Software, which was marketed by Renegade. *SWOS* gained unprecedented popularity compared to other digital soccer games and even digital sports game of the twentieth century and the first five generations of consoles. As a consequence, a list of the ten most important digital games of all time, compiled by Henry Lowood of Stanford University, featured *SWOS* as its only sports game (Chaplin 2007, E7). Even though any list of that kind must be treated with skepticism, it is striking that the five experts put *SWOS* in the company of games such as *Zork* (1977), *Tetris* (1984), *Super Mario Bros. 3* (1988), *SimCity* (1989), and *DOOM* (1993) as the only sports game on the list. In many ways, then, it is partly the success and respect that *SWOS* gained that further solidified soccer as a crucial element in digital gaming cultures. Still, the minifranchise *Sensible Soccer* did not make the transition to the fifth console generation and was devastatingly impacted by Commodore's bankruptcy around the same time in the early 1990s.

Around the same time, Japanese publisher Konami released a soccer game, *International Superstar Soccer* (1994), for the Super Nintendo Entertainment System (SNES) that would provide the foundation for the *International Superstar Soccer* (*ISS*) franchise, which itself was revamped as *Pro Evolution Soccer* in Europe and *Winning Eleven* in North America, starting with the sixth console generation. Konami thus maintains the role of the sole competitor to EA Sports' *FIFA* series, which was originally published in 1993 as *FIFA International Soccer* by the Canadian EA studio and has since been able to uphold its status as the leading global soccer game across consoles and PCs. By September 2018, the latest installment at the time, *FIFA 18* (2017) had sold more than twenty-four million copies worldwide, ranking it twenty-first on the list of best-selling digital games of all time (see Baerg 2013; EA Sports 2018).

As holds true for digital sports game on the whole, the *FIFA* series features a decisive effort to recreate the televised live event of the respective sport across its off-line and online modes on at least three levels: (1) on the level of graphics and visuals, starting with the televisual logics of the camera as the organizing principle of the game's aesthetics to the motion capture of key players (and the atmosphere of a live event filmed in a stadium); (2) on the level of licenses, including original team and player names, preranked by the producers in accordance with their collective and individual levels of skill, but also featuring the voices and commentary of broadcasting personnel of the TV stations televising the real-life leagues and competitions featured in the games; and (3) on the level of the assumed realism of the gameplay and the overall physical reality of the digital game version of the soccer game at hand.

Recent installments of the *FIFA* series have utilized the Frostbite 3 engine for most systems, which EA deploys across a spectrum of its productions, and have premiered—among other features—an inclusion of female soccer teams and a narrative (i.e., story) mode entitled *The Journey*, which allows gamers to customize an avatar/hero called Alex Hunter and simulate his career in the English Premier League and the world of professional soccer. As a consequence of the competition posed by Konami, both series, *FIFA* and *PES*, continue to woo (digital) soccer fans across the globe and remain creative in producing a beautiful game for the digital here and now.

Martin Lüthe

See also: Sports Games

Further Reading

Baerg, Andrew. "It's in the Game: The History of Sports Video Games." In *American History through American Sports: From Colonial Lacrosse to Extreme Sports*, Vol. 2, edited by Danielle Sarver Coombs and Bob Batchelor, 75–90. Santa Barbara, CA: Praeger, 2013.

Chaplin, Heather. "Is That Just Some Game: No, It's a Cultural Artifact." *New York Times*, March 12, 2007: E7.

EA Sports. "EA Sports FIFA Is the World's Game." EA Sports Press Room, September 5, 2018. Available at https://www.businesswire.com/news/home/20180905005646/en/EA-SPORTS-FIFA-is-the-World%E2%80%99s-Game.

Leonard, David J. "To the White Extreme: Conquering Athletic Space, White Manhood, and Racing Virtual Reality." In *Digital Gameplay: Essays on the Nexus of Game and Gamer*, edited by Nate Garrelts, 110–128. Jefferson, NC: McFarland, 2005.

Valentine, Rebekah. "FIFA 18 Sells over 24 Million Copies." Gamesindustry.biz, September 5, 2018. Available at https://www.gamesindustry.biz/articles/2018-09-05-fifa-18-sells-over-24-million-copies.

5200. *See* Atari 5200

Fighting Games

The term *fighting game* refers to a genre that emphasizes close-range combat between two or more characters, usually with a martial arts influence. The goal is typically to deplete your opponent's health via various offensive abilities, the nature of which depends on the character being used. Each character also has a set of defensive abilities used to avoid, repel, or absorb attacks. The manner of offensive and defensive abilities varies from game to game, but the presence of both is a standard convention.

A single match in a fighting game often comprises a series of rounds, with a "first to" system for determining the winner. For instance, the first player to win two rounds is a common convention, although most home versions of various games allow the number to be changed. Rounds are commonly timed, and if time runs out, the winner is the player with the most remaining health.

OFFENSE

In many fighting games, each character has access to a set of basic and special attacks. Basic attacks tend to be activated by a single button on a controller or arcade game. For example, in Capcom's *Street Fighter II* series or SNK Playmore's *The King of Fighters* franchise, these buttons correspond to punches and kicks of varying speed and strength. Other games, notably the *BlazBlue* series and Capcom's *Tatsunoko v. Capcom* (2010), use more generic button configurations that map to weaker or stronger attacks using punches, kicks, or weaponry. Other variations include Namco's *Tekken* series, where four buttons are used for attack and are mapped to the character's four limbs. SEGA's *Virtua Fighter* series uses three buttons, with one for punches, one for kicks, and one for blocking.

Another common trope is special attacks, which are often activated through a combination or series of button inputs. These can be initiated in a variety of ways, such as pressing multiple buttons simultaneously, pressing a specific button in tandem with a directional input, or entering a series of directional inputs in quick succession followed by one or more button inputs. These allow for greater character individuality, and they are often more damaging and visually spectacular than basic attacks. Many games give each character a throw attack, allowing the player to grab the opponent and toss them in a chosen direction.

Furthermore, some games add one or more meters for each character, which can be depleted in a variety of ways. The most common example is a meter that slowly fills as a character takes damage; when full, it enables the character to perform an even more powerful and spectacular special move.

DEFENSE

In many fighting games, the attacks described here will strike an opposing character in a variety of ways and places. A kick delivered while ducking will hit lower than one delivered while jumping, for example. This forms the basis for a game's defense system. The most common defensive mechanic is a simple block, usually activated through directional input or a separate button. Blocks greatly reduce the damage delivered by an attack, although not completely (the resulting damage is referred to by players as "chip damage" because the effect is seen as chipping away at a character's health). A block is usually considered high or low, meaning that it is effective against attacks at the same height but ineffective at attacks at other heights. Some games include a middle height as well, resulting in minor variations. For example, in many *Street Fighter* games, an attack at middle height can be blocked high or low. Throws are typically unblockable.

Although blocking is present in nearly all fighting games, several franchises have implemented other defensive mechanics. Tecmo's *Dead or Alive* series features an elaborate system of counterattacks that rewards a player for correctly guessing the height of an incoming attack and responding appropriately. Capcom's *Street Fighter III* series includes a parrying system that lets players deflect attacks and immediately counterattack.

CHARACTERS

The most identifiable feature of a fighting game is the cast of available characters players can choose from; many games and franchises come to be identified with prominent characters: for example, Ryu from *Street Fighter*, Nina Williams from *Tekken*, Sub-Zero from *Mortal Kombat*, and Terry Bogard from *Fatal Fury*.

In a game, characters are often very different from each other, differing in offensive and defensive capabilities, speed, size, and overall style of play. For example, in *Street Fighter II*, Zangief is slow, strong, and powerful at very close range. Dahlsim is also slow but weaker and more effective at long range. This difference arises from the nature of each character's basic attacks (Zangief's tend to be slower and stronger, while Dahlsim's limbs stretch, giving him added range) as well as their special attacks. Early fighting games often included several "clone" or "palette swap" characters to save on memory. In early *Street Fighter* games, Ken and Ryu are nearly indistinguishable aside from the sprites used. In the early *Mortal Kombat* games, Scorpion and Sub-Zero are nearly identical, except for minor graphical differences and different special moves. In these franchises, such early technical limits have been incorporated into the fictional worlds in which the games take place. For example, Ken and Ryu are said to have trained together under the same master, thus explaining their similar fighting styles.

Although many fighting games are designed around one-on-one matches, two common team variants exist. In the first, players select two or more characters each. After each round, the winning character stays in, and the losing character is replaced by another character from the same team. Once all of a team's members have been defeated, that team loses. This method of team play can be seen in several *The King of Fighters* games as well as the *Capcom v. SNK* series. Another popular variant allows players to pick a team of characters and then freely switch between them throughout the course of the match, with the goal being the defeat of all the opposing team's members. This mode is present in all the *Marvel v. Capcom* games released to date. *Tekken Tag Tournament* (1999) modifies this mechanic in that only one character from a team must be defeated to win.

SPATIAL CONFIGURATIONS

Another key element in a fighting game is the space or arena in which the fight takes place. Two-dimensional fighting games such as the *Street Fighter*, *The King of Fighters*, and *Guilty Gear* series take place on a flat plane, with the characters shown in side view. Movement is restricted to the horizontal and vertical planes; characters can walk back and forth, jump up, and crouch down. Several *Fatal Fury* titles add a second plane located behind the first that characters can jump back to. The depth this creates is limited, however, because characters cannot occupy the space between the two planes but only pass through it.

Three-dimensional fighting games offer a greater variety of spatial configurations. In later *Tekken* games, the characters can move any direction in a predefined space, although that space does have limits. Characters are almost always facing each other, which creates an effect similar to fighting on a flat plane. This is similar to *Virtua Fighter*, although several entries in this series allow players to knock each other out of a predefined "ring," which results in a victory. The *Powerstone* series takes place in three-dimensional spaces, and the characters can run freely in all directions, much more fluidly than in *Tekken* or *Virtua Fighter*.

Several games feature what is referred to as "2.5D" graphics, which refers to configurations wherein the characters and backgrounds are rendered in three dimensions, but the gameplay only takes place in two dimensions. These games typically have a side perspective, thus resembling two-dimensional games. Examples of this type include *Super Smash Bros.* (1999) and *Street Fighter IV* (2009).

HISTORY

The first game in the fighting genre is generally considered to be *Karate Champ* (1984), an arcade game released by Technos Japan Corporation. (Although earlier games such as Cinematronics' *Warrior* [1979] and Activision's *Boxing* [1980] featured basic genre tropes, notably one-on-one combat within a confined space, they are not often cited as part of fighting game history. This is due to their top-down perspective, lack of defensive game mechanics, and the fact that they were not inspired by Asian martial arts. In this respect, the term *fighting game* refers to a relatively narrow set of games.) Many current genre conventions were established when Capcom released *Street Fighter II* to arcades in 1991. Although this title built on the earlier *Street Fighter* (1987), it was more successful, leading to a period of explosive growth in the genre. Soon after came Midway's *Mortal Kombat* (1992). This game was very controversial in the United States because of its violence, particularly the "fatality" moves that allowed a character to kill an opponent after winning. These moves were very graphic, often featuring dismemberment and large quantities of blood, albeit with a slight sense of dark humor. Japanese developer SNK released several fighting games in this period, notably *Fatal Fury* (1991), *Art of Fighting* (1992), and *Samurai Showdown* (1993). Another fighting game milestone was SEGA's *Virtua Fighter* (1993), the first in the genre to feature fully three-dimensional characters.

During the mid to late 1990s, the genre's popularity in the United States began a rapid decline. New games were still being released at a fairly continuous rate, but none approached the success of *Street Fighter II*. The reason for this decline is generally considered to be a combination of two factors. The first was the oversaturation of the market; after *Street Fighter II*, many developers pushed imitations to market. Most of these imitators were unpopular, usually due to poor quality and because they were perceived as little more than attempts to cash in on a current fad. The second major reason was increasing complexity. As the genre evolved, the games required players to learn more commands, game mechanics, and systems, thus increasing the barrier to entry and narrowing the viable audience to the most dedicated players.

Even so, during this time, several major games were released. SNK began its now iconic *The King of Fighters* series in 1994, starting a tradition of annual releases that would last until 2003. *The King of Fighters* existed alongside SNK's other franchises (notably *Fatal Fury*, *Samurai Showdown*, and *Last Blade*), including characters from each. That same year, Namco released *Tekken* to the arcades and the Sony PlayStation. *Tekken* featured three-dimensional characters and placed heavy emphasis on long, complex combos. Arc System Works released *Guilty Gear*, a new two-dimensional franchise, in 1996. *Soul Blade*, another three-dimensional game by Namco, was released in 1997 and later evolved into *Soulcalibur*. During this period, the *Street Fighter* and *Mortal Kombat* franchises also saw a number of releases. Capcom was particularly prolific, releasing games in the two-dimensional *Street Fighter Alpha*, *Street Fighter III*, and *Marvel v. Capcom* series. *Mortal Kombat* switched to three-dimensional graphics with *Mortal Kombat 4*, released in 1997.

Despite the large quantity of games being released, fighting games (particularly two-dimensional games) stayed in decline through the early 2000s. However, beginning in 2008, several releases began to reinvigorate the genre in the United States. That year, Capcom released *Super Street Fighter Turbo HD Remix* for the Microsoft Xbox 360 and Sony PlayStation 3. This was a rebalanced version of *Super Street Fighter II Turbo* and featured new high-definition art and online play. In 2009, they followed with the long-awaited *Street Fighter IV*, which saw enormous success. Also that year, Arc System Works released *BlazBlue*, a new franchise and spiritual successor to *Guilty Gear*, to significant critical acclaim. Although it was less well received, SNK Playmore released *The King of Fighters XII*, which also featured a high-definition graphical overhaul (see *King of Fighters, The* Series).

Fighting games continue to appear, both as a part of broader franchises that include games in other genres, such as *Kirby Battle Royale* (2017) and *Super Smash Bros. Ultimate* (2018), and as continuations of long-running fighting game series, such as *Street Fighter 30th Anniversary Collection* (2018), *Dead or Alive 6* (2019), and *Mortal Kombat 11* (2019).

Jason Scott Begy

See also: Sports Games

Further Reading

GameSpot. *The History of SEGA Fighting Games*. 1997. Available at https://web.archive.org/web/20090517063548/http://www.gamespot.com/features/vgs/sat/segafight/page11.html.

GameSpot. *The History of Street Fighter*. 1999. Available at https://web.archive.org/web/20090204224001/http://www.gamespot.com/features/vgs/universal/sfhistory/history.html.

Shoryuken community fansite. Accessed September 13, 2020. Available at http://www.shoryuken.com.

Film

The history and evolution of video games as a medium and an industry is inextricably intertwined with film. Both have origins as coin-operated boardwalk entertainment, with film evolving from simpler technologies, such as the camera obscura and Edison's Kinetoscope, and video games evolving at least in part from midway attractions, such as shooting galleries, pinball, and other games of chance and skill. Although both have roots in arcades and the nickelodeons, they also share an evolution from simple attractions into technically advanced, narratively and artistically sophisticated forms, and their respective industries have similarly struggled for social acceptance and legitimacy as their financial significance has grown. However, as the solidification of the film industry and the blossoming of the film medium came several decades before the commercial viability of video games, it has been perhaps inevitable that film, both as commerce and as art, has overshadowed video games to an extent that only recently has begun to be reversed. As computers have become more powerful, affordable, and available, and as the video game industry has shifted from the destination-based medium of arcades to the home-based medium of consoles and computers, the video game industry has likewise shifted from a lesser and sometimes ancillary role to film into an equal and competitive generator of intellectual property, income, and social commentary.

The film industry was an early adopter of video games as a source of inspiration, directly in the adaptation of stories and characters from games to film but also in understanding the burgeoning importance of video game art and culture. The results have not always been artistically or commercially successful. Initially, films based on or generally concerning video games have also tended to display the imbalance of position between the two industries. Whereas films such as *Tron* (1982), *The Last Starfighter* (1984), and *The Wizard* (1989) reflect the growing significance of video games by prominently featuring video game players in their narratives, the tendency is to portray those characters as socially awkward and the medium as essentially adolescent, with much of the narrative conflict depending on the main character's transition into a more vibrant and respectable reality by leaving video games behind.

Similarly, early attempts to translate video games into film were largely the domain of low budget productions, with films such as *Super Mario Bros.* (1993) and *Street Fighter* (1994) attaining a certain critical notoriety for their artistic limitations. More recently, films based on the *Tomb Raider* franchise (2001, 2003, 2018), *Warcraft* (2016), *Assassin's Creed* (2016), and *Rampage* (2018) have served as the basis for financially successful action films, though, again, critical reception generally ranged from lukewarm to poor. With the aggressive growth of streaming video services, direct-to-video adaptations have also seen increased production, with franchise-based films such as *Halo* (2010), *Dead Space* (2011), *Mass Effect* (2012), and *Dead Rising* (2015, 2016) in streaming-only release. Similarly, anime franchises such as *Yo-Kai* and *Pokémon* continue to generate and coordinate their television and film releases with their collectible card game (CCG) and video game releases.

Likewise, a segment of the video game industry has directly depended on film adaptation, with game development studios attempting to turn a narrative form into compelling gameplay. This has produced a wide range of results, from early attempts such as the now legendary failure of Atari's *E.T.: The Extra-Terrestrial* (1982) to later, more successful games such as *The Chronicles of Riddick: Escape from Butcher Bay* (2004). The regular widespread production of video games based on films is now a thriving, if artistically disputed, sector of the video game industry. Similarly, films based on video games have ranged from B-film legend

Uwe Boll's *In the Name of the King: A Dungeon Siege Tale* (2008), based on the series from Microsoft and 2K, and *Postal* (2008), published by Ripcord Games, to the financially viable though lukewarmly reviewed *Resident Evil* film series based on Capcom's horror franchise of the same name. Nearly every major action film release, particularly the summer blockbuster, is accompanied by a video game version, usually shipped simultaneously. Although some critics deride the quality of these games, the commercial success of games such as Activision's *Spider-Man* series, EA's *Harry Potter* series, Activision's *Kung Fu Panda* series, and games based on Warner Bros.' *LEGO* movies guarantees that video games will continue to have a close relationship with movies.

Most major non-film-based video game successes are also quickly optioned for film adaptation, even if the films never reach the silver screen. Seen in that light, the coevolution of film and video games has seen a gradual shifting from film overshadowing video games and essentially treating them as ancillary products to the film intellectual property (IP) toward a more equally footed situation in which ideas, commerce, and developers begin to flow back and forth between the two industries. The growing tendency to develop creative IP by simultaneously planning for film, video games, and other media, or the emphasis on franchises as comprehensive fictional worlds or sources from which numerous media products can evolve, has led to what Henry Jenkins refers to as "convergence culture" (Jenkins 2006, 2), the emphasis being that media, audiences, and content are converging upon each other rather than being treated as discrete products (see also Subcreation).

Nevertheless, comparisons between the two industries are still lopsided affairs. Despite the common myth that the video game industry is larger in terms of annual revenue than the film industry, in truth, the film industry continues to dwarf the video game industry. It is difficult to estimate a single figure for gross or net profits from the global film industry, in part because of its massive scope and in part from the general reluctance of film companies to release hard numbers on their net profits. Similarly, drawing direct comparisons between the film industry and the video game industry is an imprecise comparison because the film industry includes home video sales, TV and cable distribution, licensing, and other revenue sources beyond box office sales. Indeed, as Toby Miller et al. (2001) note, "Theatrical exhibition accounts for barely a quarter of Hollywood's global revenues" (8). Figures do not account for other national film sectors, whereas the video game industry to date is still largely based on one source of revenue, the game itself, whether it is distributed via hard media, such as a disk, or online. Opportunities for ancillary profits, though growing, are far fewer. The pervasiveness of the false claim that the video game industry is larger than the film industry is contradicted by simple comparison. The year 2017 saw $36 billion in video game content spend in the United States (ESA 2018, 10). Box office sales alone in the United States for 2017 exceeded $40.6 billion, a number that does not include streaming, television, and video revenue. If the additional sources of revenue available to film companies, particularly the larger conglomerates such as Sony and Time Warner, were included in those figures, the gap between industries would grow even larger.

The influence of film on video games is clear. Although video games have origins, in part, in midway and carnival games, the hard origin of the medium, based directly on computer technology, owes a great deal to science fiction film tropes. *Spacewar!* (1962), often credited as the first interactive computer game, features a duel between two spaceships in a direct analogue to popular science fiction films of the era. Similarly, popular games of the arcade era, such as *Space Invaders* (1978) and *Asteroids* (1979), clearly owe a debt to the science fiction film boom of the 1970s and 1980s. However, many of the great successes of the video game industry exist separately from film tropes, with an emphasis on ideas and gameplay that seem to owe little to film. From early sports simulations such as *PONG* (1972) to novel creations such as *Pac-Man* (1980) and *Donkey Kong* (1981), the film industry seemed for a time to be following behind the video game industry and, if anything, looking to it as a source of easy, if not always successful, inspiration. As movies based on video games and video games based on movies became a standard for each industry, the clear lines between the two industries increasingly blurred.

With the video game industry crash of 1983, in which numerous major players collapsed or experienced severe reduction, many film companies backed away from video games in general, spurred in part by critical and commercial flops, such as Atari's *E.T.: The Extra-Terrestrial* (1982). Tempted by the success of home video game releases such as *Space Invaders* and *Asteroids* and anticipating enormous sales based on the blockbuster success of the Spielberg film, Atari's parent company, Warner Communications, itself a branch of the Warner Bros. movie-based entertainment conglomerate, directed the company to rush the production of the game for the market-dominant Atari home console. As sales of *E.T.* and similar low-quality titles stalled at launch, Atari suffered $536 million in losses. Warner Communications sold Atari in 1984, and millions of *E.T.* cartridges were buried in the New Mexico desert (Kent 2001, 240). Other film-based companies followed suit, divesting themselves of holdings in video games as the industry went into a long decline in the 1980s, particularly in the arcade sector.

The trend of the film and video game industries coming together and then separating continued over the following two decades. Synergy between film and video games, although attractive on the surface, faces several immediate challenges. Early video games were conceptually obligated to film but tended to focus on gameplay over other factors, such as narrative content or graphic quality. Part of this was directly due to the computational limits of early video game hardware. With limited means, early games necessarily focused on interactivity over story or graphical capacity. Early experiments in making games more like movies—such as the laserdisc games *Dragon's Lair* (1983) and *Space Ace* (1984)—offered film-quality graphics and animations, but gameplay was limited to a series of memorized choices made through the joystick. Playing the game became a matter of knowing the correct order of joystick moves, with no variation or skill required beyond memory and timing. However, as computer capacity has grown so has the ability of video games to offer film-quality graphics while maintaining a film-like narrative through voiceover content and cinematic cutscenes.

It is perhaps not a coincidence that most media conglomerates are now solidly invested in video games once again, with major film companies such as Disney and Warner Bros. growing their interactive divisions; at the same time, companies that started in electronics and video games, such as Sony and Microsoft, are increasingly directly involved in film production or are aggressively licensing their IP for film adaptation, as with Peter Jackson's now shelved *Halo* film project. Other movie studios, such as Paramount, have decreased their video game production, often merging them into a multiplatform division, such as Paramount Digital Entertainment, which has not developed games since 2013 but is active in developing content for entertainment streaming channels. As films come to rely more on computer-generated images and the tools used to create video games become more sophisticated and require more computational power, the two industries are converging along lines of technology and labor as well, with the software being used to create film effects often being the same used to create video games, and the practitioners of those skills are able to move more freely back and forth between the two industries. This will most definitely have a direct effect on the convergence of the media as ideas are shared across industries. Similarly, the industries continue to share in advancing software and hardware technology, a case shown most clearly in the hardware wars between Sony and its Blu-ray technology on one side and Microsoft's backing of HD-DVD. The outcome of that competition bore consequences not only for home video sales but also for the video game industry as the means of distributing console games.

Film industry influence is only one thread among many in the overall evolution of the video game as an industry and as a medium. However, the undeniable ongoing role of film as a source of both inspiration and finance is a crucial factor for understanding both the history and the contemporary position of video games.

Trevor Elkington

See also: Interactive Movies; Silent Film; Video Game Movies

Further Reading

Acland, Charles R. *Screen Traffic: Movies, Multiplexes, and Global Culture*. Durham, NC: Duke University Press, 2003.

Alley, Dodd. *Gamers and Gorehounds—The Influence of Video Games on the Contemporary American Horror Film*. Saarbrucken, Germany: VDM Verlag, 2007.

Elkington, Trevor. "Too Many Cooks: Media Convergence and Self-Defeating Adaptations." In *The Video Game Theory Reader 2*, edited by Bernard Perron and Mark J. P. Wolf, 213–235. New York: Routledge, 2009.

Entertainment Software Association (ESA). "2018 Sales, Demographics, and Usage Data: Essential Facts about the Computer and Video Game Industry." *Entertainment Software Association Archive* (December 24, 2018). Available at https://web.archive.org/web/20190124025835/http://www.theesa.com/wp-content/uploads/2018/05/EF2018_FINAL.pdf.

Jenkins, Henry. *Convergence Culture*. New York: New York University Press, 2006.

Kent, Steven L. *The Ultimate History of Video Games: From Pong to Pokémon and Beyond*. New York: Three Rivers Press, 2001.

Leggat, Graham. "Chip Off the Old Block: Video Games and the Film Industry Have Become a Billion-Dollar Father-Son Act." *Film Comment* 40, no. 6 (2004): 26–30.

Mack, Jonathan. “Evoking Interactivity: Film and Videogame Intermediality since the 1980s.” *Adaptation* 9, no. 1 (2016): 98–112.

McDonald, Paul, and Janet Wasko. *The Contemporary Hollywood Film Industry*. Hoboken, NJ: Wiley-Blackwell, 2008.

Miller, Toby, et al. *Global Hollywood*. London: British Film Institute, 2001.

Miller, Toby, et al. *Global Hollywood: No. 2*. London: British Film Institute, 2008.

Motion Picture Association of America. “THEME Report: A Comprehensive Analysis and Survey of the Theatrical and Home Entertainment Market Environment (THEME) for 2017.” *MPAA Archive* (December 24, 2018). Available at https://www.mpaa.org/wp-content/uploads/2018/04/MPAA-THEME-Report-2017_Final.pdf.

Finland

Finland, a forest-filled Nordic country with 5.5 million inhabitants, has grown larger than its size in terms of its video games culture and industry. Today, it is particularly known for successful mobile games, but Finland has a long history in games. An important phase was the introduction of home computers, particularly the Commodore VIC-20 (1981), Amiga (1982), and Commodore 64 (1983) into Finland. The early hobbyist cultures started evolving at that point into a gaming and programming subculture. Finland is highly ranked in regard to education (as witnessed by the top positions in the international PISA studies), engineering, design, and the fine arts, and computer and video games emerged as an area where all these strong traditions could be exploited in creative, playful combinations.

Dominated initially by young boys and men, the Finnish home computer culture has supported the evolution of dedicated publications such as the general IT magazine *MikroBitti* (1984) and games magazine *C-lehti* (1987), which was later rebranded as *Pelit* (1992), both with the largest circulations of their kind in the Nordic. The illegal sharing and cracking of copy protection of video games was an important element in the creation of community; the crack intros (computer-animated title screens) designed by the computer software cracker teams soon evolved into demos, noninteractive real-time presentations of computer art. The gatherings of these *demoscenes* grew into important breeding grounds for Finnish video game developers. Today, there are still important annual events, such as Assembly, where thousands gather to spend days (and nights) together with games and computer art.

The first Finnish video games were programmed in the early 1980s for the popular Commodore home computers. Printing the programming code in magazines such as *MikroBitti* was an early form of game publishing. The pioneering commercial developers were solitary individuals, such as Stavros Fasoulas and Jukka Tapanimäki, who both got their Commodore 64 games into international distribution in the late 1980s. From early on, there was a broad range of genres that Finnish developers were applying in their work. Copying or liberal borrowing from successful games, such as *Tetris* (1984) and *Elite* (1984), was in ample evidence, but so was original creativity. The first Finnish game development companies, Terramarque and Bloodhouse, were established in 1993; they merged into a new, larger company, Housemarque, in 1995.

The great Finnish IT success story was Nokia, which established itself as the global leader in mobile phones during the 1990s. The public perception of Finnish game development also largely focused on games for mobile handsets. There were several mobile gaming companies founded during the early 2000s, but sales and international visibility have actually been greatest in console games, such as Housemarque's *Supreme Snowboarding* (1999), and PC games, where games have ranged from the teen virtual world *Habbo Hotel* (2000) by Sulake to the third-person shooter *Max Payne* (2001) by Remedy Entertainment. With its innovative combination of a free game world with micropayments and virtual item trade, *Habbo* was a pioneer of the *freemium* model that later became one of the cornerstones in the commercial success of Finnish games.

Direct digital distribution and trading through venues such as the App Store for Apple's iOS devices have evoked global interest in the mobile gaming sector. Initially, producing mobile games was a very challenging enterprise; the handset market in the late 1990s and early 2000s was a highly fragmented environment. With variable hardware specifications, such as screen sizes and processors, and many different mobile phone operating systems, several Finnish mobile game developers had to develop, test, and release each game in literally hundreds of different versions. Access to consumers was channeled through network operators, who decided which games were given the best positions in the operator decks, typically favoring familiar brand names. Consequently, the complex and risk-averse mobile game ecosystem was highly problematic for any real innovation to emerge. There were, nevertheless, some interesting and innovative releases, such as RedLynx's *Pathway to Glory* (2004), a turn-based tactical strategy game that allowed real-time mobile multiplayer gaming over mobile data.

Already by 2011, it was estimated that almost 40 percent of all Finnish game developers were designing games for mobile devices. At this point, there were around 70 game development companies in Finland, with an estimated turnover of EUR 165 million. The following years exhibited powerful growth that finally appeared to flatten a bit in the latter part of 2010s. In the peak year of 2016, the total income of the Finnish game industry was EUR 2.5 billion. At this high point, there were 260 game development companies in Finland that employed almost three thousand people.

While there have been several international success stories, such as Rovio, with its *Angry Birds* series of games starting in 2009, a very large part of the industry's income was due to the phenomenal success of a single company, Supercell, which was established in 2010, with key people who had experience from earlier game studios, such as Sumea. Supercell has produced a series of highly popular games for mobile devices: *HayDay* (2012), *Clash of Clans* (2012), *Boom Beach* (2014), *Clash Royale* (2016), and *Brawl Stars* (2017). Supercell's trademark is to focus on various currently popular game types—ranging from farming simulation to real-time strategy (RTS) and multiplayer online battle arenas (MOBAs)—and reinterpret them as mobile device–optimized freemium experiences. The annual income of Supercell has stayed for several years at the EUR 2 billion level.

Within a few decades, video games and gaming became established in Finland as a mainstream activity. The annual Finnish Player Barometer study has tracked the popularity of playing games of all kinds in Finland, and the results suggest that almost everyone plays—at least sometimes and something. Around 60 percent of people reported playing some digital game at least once a month, and when card games, board games, outdoor games, and participation in the lottery and other forms of gambling are included, around 90 percent of Finns report at least some form of game playing. There is no single game genre that dominates Finnish game culture, but puzzle games are the most popular when all age groups are taken into account. For younger generations, shooting games and adventure games are the most popular kinds of games.

The official cultural and societal recognition of game cultures has grown in Finland in recent decades. The Finnish Museum of Games opened in 2017 in Tampere, with the combined support of a crowdfunding campaign and public support by the City of Tampere. The Academy of Finland has also established long-term funding for the Centre of Excellence in Game Culture Studies for carrying out research into games and play in culture and society.

Frans Mäyrä

See also: Denmark; Norway; Sweden

Further Reading

Kuorikoski, J. *Finnish Video Games: A History and Catalog*. Jefferson, NC: McFarland, 2015.

Mäyrä, Frans. "Finland." In *Video Games around the World*, edited by Mark J. P. Wolf, 159–173. Cambridge, MA: MIT Press, 2015.

"First" Video Game

Determining what video game can be called the "first" involves defining what exactly one means by *video game*, which itself depends on definitions of *video* and *game*. Both terms have definitions that range from precise technical or conceptual criteria that narrowly define them to broader popular usages that tend to be very inclusive and loosely defined, yet have an effect on the ways video games are produced, marketed, and used.

The earliest recorded idea for an electronic interactive game can be found in U.S. patent #2,455,992 for a "Cathode-Ray Tube Amusement Device" from 1948. The device described did not get beyond the prototyping stage, nor did it produce a video signal, which, by a strict definition, would have denied it status as a *video* game, even if it had gone to market. Likewise, most mainframe games, such as versions of tic-tac-toe like *OXO* (1952), which displayed its imagery on a 35-by-15 dot cathode-ray tube, did not produce a video signal, and Willy Higinbotham's electronic experiment *Tennis for Two* (1958) used an oscilloscope to produce its imagery and also did not produce a video signal. Also, early simulation games, such as *The Management Game* (1959), used computers but were mostly text based and are generally not considered *video games* by today's standards.

One mainframe game, *Spacewar!* (1962), by Stephen Russell, J. Martin Graetz, Alan Kotok, and Wayne Witanen, is probably most often cited as the first real video game, as it was written for the PDP-1 computer and used a cathode-ray tube as its display (although it used vector graphics, not raster graphics). *Spacewar!* also influenced the industry that was to follow because it inspired the first coin-operated video game, *Galaxy Game* (1971), as well as the first mass-produced video arcade game, *Computer Space* (1971), and the first two commercial vector games, Cinematronics' *Space Wars* (1977) and Vectorbeam's *Space War* (1977).

In 1951, inventor Ralph Baer had the idea for home video games that could be played on a television set while designing and building a TV set at Loral, in New York. He returned to the idea in 1966, when he wrote a four-page description of a home video game system, for which he received a patent in 1967. Baer created a series of prototypes over the next two years, the last of which became the first Magnavox Odyssey system, which became the first home console game system in 1972. The Odyssey began the home video game industry and was also an inspiration for *PONG* (1972), the first hit arcade game.

The definition of *game* also demarcates what will be considered a video game (see Game, Definition of). This usually requires such things as play according to rules, some kind of valued outcome (such as a win or high score), and a competitive or cooperative gameplay situation or, in the case of single-player games, a challenge to be overcome. Although they may be popularly considered as games, some programs, such as *Myst* (1993) and those of the *Sim* series, do not contain all the elements that a very strict definition of *game* might require, nor would certain programs used for the purpose of education qualify, such as *Mario Teaches Typing* (1991). However, by broader, more loose definitions found in popular usage and by software marketing departments, many of these programs are referred to as games. Some argument can be made for their inclusion, insofar as they use similar displays and interface devices as video games and contain challenges that require skills and problem-solving abilities, much as games do, and the fact that they are played in a manner similar to games.

Mark J. P. Wolf

See also: Computer Space; Galaxy Game; Idea for Home Video Games; Spacewar!

Further Reading

Ahl, David H. "Mainframe Games and Simulations." In *The Video Game Explosion: A History from PONG to PlayStation and Beyond*, edited by Mark J. P. Wolf, 31–34. Westport, CT: Greenwood Press, 2007.

Baer, Ralph H. *Videogames: The Beginning*. Springfield, NJ: Rolenta Press, 2005.

First-Person Shooters (FPSs)

First-person shooter (FPS) is a generic label that grew popular in the second half of the 1990s. Similar labels, such as *first-person combat* and *first-person zapper*, surfaced much earlier in the gaming community to describe video games that involved spatial navigation on the depth axis and shooting mechanics. The current popularity of the genre led to a tendency to apply the FPS label to precursors (such as shooting galleries). Our contemporary understanding of the label tacitly implies an anthropomorphic avatar and a complication of navigational/shooting performance through a mix of environmental activation and resource management. The genre is also associated with competitive online gaming thanks to the popularity of recent franchises such as *Unreal Championship*, *Halo*, *Battlefield*, and *Call of Duty*.

All these elements have surfaced in video games before the advent of the FPS label. Video game historiography often highlights the role of Id Software in the crystallization of the FPS genre. This entry presents the construction of this gameplay formula and its generic label as a way to supplement the historical myth.

ORIGINS

Shooting galleries have been identified as precursors in the genealogy of FPS (Wolf 2012). Automation of sportive shooting competition can be traced back to *Automatic Shooting Range* (1895), and electromechanical shooting galleries were commonly seen in arcades following the success of *Shoot the Bear* (1947). While these machines involved perspectival depictions and aiming along the depth axis, they were seldom defined as *first-person*. Shooting galleries typically do not integrate navigational mechanics, but the rail shooter variation—found in games of the *Time Crisis* and *House of the Dead* series—automatically moves players through space. These games are sometimes associated with the FPS genre.

It is common to place *Maze War* at the beginning of the FPS genealogy. In 1973, Steve Colley and a few colleagues programmed a competitive death match game on an Imlac computer that relied heavily on spatial exploration. Using a local network connection between two computers, two players could hunt each other down in the titular maze. The environment was represented using perspectival drawing techniques, but navigation was elliptical in nature: players jumped forward in space and rotated through ninety-degree increments. This navigational model was developed further in the role-playing game (RPG)/dungeon crawler genre throughout the 1980s and up to the early 1990s; many of these titles also integrated fighting and shooting mechanics. Atari's arcade game *Battlezone* brought fully animated synchronic visual navigation to the death match formula in 1980; three-dimensional shapes were drawn at a fast pace on a vector display to simulate real-time tank driving and shooting action. In the arcade flyer, Atari described its game as "first-person combat."

In the Alto computer port of *Maze War*, the perspectival display appeared on top of an overhead map view. This visual configuration—involving both a first-person view and a synoptic overview, presented as part of a heads-up display—is often seen in the FPS genre and has been imported most directly by Paul Allen Eldenstein for *Wayout* (1982) and *Capture the Flag* (1983). These games integrated the popular death match/capture-the-flag game modes through synchronic spatial navigation in three dimensions on Atari 400/800 computers. *Maze War* on the Alto indicated player damage through a full-screen color flash; this common semiotic marker can also be found in Id Software games and has been refined in contemporary FPS games.

VEHICULAR ADVENTURES

While *Maze War*'s players in some versions were portrayed through a somewhat anthropomorphic giant eyeball and *Wayout*'s protagonist was depicted as a clown on paratextual elements, early FPS history can be traced back to the vehicular genre to a large extent. Before producing *Wolfestein 3-D* (1992) and *DOOM* (1993), Id Software developed elements of its FPS engine in *Hovertank* (1991); the latter follows in *Battlezone*'s tank tracks to a large extent. When the expression *first-person shooter* became more common in the 1990s, it was commonly used to describe vehicular shooters such as *Descent* (1994) and *Quarantine* (1994). Considering that avatars have been theorized as vehicles, and with so many anthropomorphic protagonists benefiting from cybernetic enhancements, it could be argued that dozens of tank, boat, train, aircraft, and fantasy vehicle simulators released in the 1980s on personal computers should be integrated in the FPS lineage (to give but a few examples: *Strike Force Harrier* [1986], *Space Station Oblivion* [1987], *The Train: Escape from Normandy* [1987], *Falcon* [1987], *Sherman M4* [1989], and *Gunboat* [1990]). In terms of cyborg titles, the first *Terminator* game produced by Bethesda (1991) corresponds to our contemporary understanding of the FPS to a large extent.

Vehicular simulations often lack the diversity of actions that became implicitly associated with the FPS genre. This is an interesting paradox: while the generic label insists on shooting mechanics, the formula that became popular in the 1990s complicates this firing action with obstacles to navigate, resources to manage, and environmental mechanisms to activate. Even Id Software seemed reluctant to use the "shooter" label at first. *DOOM* was referred to as "first-person perspective adventure," with paratextual elements insisting on the plurality of mechanics that players needed to master to progress. Here again, many prior titles have integrated similar formulas. Lucasfilm's *Koronis Rift* (1985) was defined as a "first-person strategy and adventure." In *Space Station Oblivion*, players needed to neutralize deadly security systems, activate mechanisms, and position a drill in each level to progress. In the mainframe game *Spasim* (Jim Bowery, 1974), one of the first games integrated in the genealogy along with *Maze War*, up to thirty-two players could compete at the helm of a space vehicle in a three-dimensional world; the second version of the game integrated extensive resource management mechanics.

It is unsurprising to see the emphasis put on *Wolfenstein 3-D* and *DOOM* in journalistic and academic accounts of the genre's history considering the technological excellence and commercial success of these titles. As this overview demonstrates, the refinement of anthropomorphic vision, three-dimensional exploration, shooting scenarios, and adventure elements merged in video game history a long time before the commercial explosion of Id Software games.

Finally, it should be noted that the historical evolution of FPS mechanics has been influenced by player exploits and glitches to a large extent, for instance, with the integration of rocket jumping and strafe jumping (Lederle-Ensign and Wardrip-Fruin 2016).

Carl Therrien

See also: Shooting Games

Further Reading

Galloway, Alexander. *Gaming. Essays on Algorithmic Culture.* Minneapolis: University of Minnesota Press, 2006.

Lederle-Ensign, Dylan, and Noah Wardrip-Fruin. "What Is Strafe Jumping? IdTech3 and the Game Engine as Software Platform." *ToDiGRA* 2, no. 2 (2016). Available at https://pdfs.semanticscholar.org/3cb9/5f6a5c36bf26725bd29dbbdad528b07af8c7.pdf.

Rehak, Bob. "Genre Profile: First-Person Shooting Games." In *The Video Game Explosion: A History from PONG to PlayStation and Beyond*, edited by Mark J. P. Wolf, 187–193. Westport, CT: Greenwood Press, 2007.

Schiffler, Andreas. "Battlezone, the First VR Game." In *Space Time Play: Computer Games, Architecture and Urbanism: The Next Level*, edited by Friedrich von Borries, Steffen P. Walz, and Matthias Böttger, 36–38. Berlin, Germany: Birkhäuser, 2007.

Therrien, Carl. "Inspecting Video Game Historiography through Critical Lens: Etymology of the First-Person Shooter Genre." *Game Studies* 15, no. 2 (2015). Available at http://gamestudies.org/1502/articles/therrien.

Voorhees, Gerald A., Joshua Call, and Katie Whitlock, eds. *Guns, Grenades, and Grunts: First-Person Shooter Games*. New York: Bloomsbury Academic, 2012.

Wolf, Mark J. P. "*BattleZone* and the Origins of First-Person Shooting Games." In *Guns, Grenades and Grunts: First Person Shooter Games*, edited by Gerald Voorhees, Joshua Call, and Katie Whitlock, 25–40. New York: Continuum, 2012.

Flow. *See* Immersion

Football Games

Sports video games have played a significant role in the history and development of video games generally. Many of the earliest electronic games, such as *Tennis for Two* (1958) and *PONG* (1972), were modeled directly on physical game forms (e.g., tennis and ping-pong). The increased popularity of football video games coincided with the rise in video game culture, particularly in the United States. From their beginnings in the arcade to their current residence in the home (on consoles and computers), football video games have remained a vital and popular playing choice.

STYLES OF GAMES

Football video games employ three basic simulation styles: management simulation, action simulation, and extreme simulation (Conway 2007). Games of the first type, management simulations, focus their attention on the outcomes of a real-world sport (Conway 2007). These games emphasize strategic thinking and game planning. Many of these games, such as *Front Office Football* (1999) and *NFL Head Coach* (2006), deemphasize graphic representation while focusing on real-world statistics. Games of the second type, action simulations, both attempt to simulate realism and also allow players to influence results (Conway 2007). These types of simulations allow players to control a team and players while remaining within the realm of statistical plausibility. Action simulation games often visually mirror televised sporting events (the game looks similar to a real NFL game). The *Madden Football* series and *NCAA Football* series are popular examples of action simulation games. Action simulations can be seen as a middle ground between management simulations and the third style of simulation, extreme simulations (Conway 2007). Extreme simulation games do not emphasize realism. This style of game exaggerates the more exciting moments of sports. The *NFL Blitz* series and *NFL Street* series exemplify the exaggerated visual style inherent in the extreme simulation game. Each style of simulation focuses on different types of visuals and emphasizes different elements of football.

HISTORY

Throughout the mid-1970s, football video games were primarily produced for arcade games, including *Football* (1978), *10-Yard Fight* (1983), and *Tecmo Bowl* (1987). Some of these games helped popularize the trackball format (a pointing device, similar to a computer mouse, used in arcade games). While arcade games remained popular, they soon faced greater competition from home video games, such as *Football* (1978) and *RealSports Football* (1982) for the Atari 2600, *NFL Football* (1979) for the Mattel Intellivision, and *Super Action Football* (1984) for the ColecoVision. Although these games incorporated the basic elements of football, they were generally rather schematic and lacked detail.

Progress regarding the style and variety of games accelerated in the late 1980s, when players could participate in football arcade games, computer-based games, and home console games. Accolade’s *4th & Inches* (1987), for the Commodore 64, Apple II, and other home computers, introduced play calling, allowing players to strategically pick team formations. Atari Games’ *Cyberball* (1988) took place in the year 2022 and employed robotic avatars to play football. *Tecmo Bowl*, originally released as an arcade game in 1987, was ported to the Nintendo Entertainment System (NES) in 1989 and was the first home console football game to use real NFL players. In 1988, EA Sports’ *John Madden Football* (1988) debuted, beginning the series that would later be known as *Madden NFL* and which continues today.

By the mid-1990s, a wide variety of styles and types of football games were readily available, making the late 1990s a golden era of creativity for football video game development. Some football games of the period, such as *Bill Walsh College Football* (1993) (later renamed *NCAA Football*), specifically focused on college football. Games such as *Backyard Football* (1999) inventively changed the dynamics of the average football game by using children as players (and even presented some professional football players as children). Throughout the 1990s, game creators continued to innovate and update football video games, and some games started series, with a new version of their game released every year (updating players, visuals, and various other details).

The football video game market in the early 2000s was crowded with a profusion of variants and styles of games. In 2004, EA Sports—a prominent sports game producer—changed the football video game landscape by signing a five-year exclusive licensing agreement with the NFL. The signing of this license agreement was motivated in part by market competition between EA Sports and 2K Sports, another popular game producer. 2K Sports sold its football video game, *ESPN NFL 2K5* (2004), for $19.99, significantly lower than many other football video games, particularly EA Sports' game *Madden NFL 2005* (2004) at $49.99. The EA Sports license agreement with the NFL prohibited any other game producer from using NFL players, stadiums, teams, or logos. The following year, EA Sports signed a significant license agreement with the NCAA. This six-year agreement assigned to EA Sports the sole right to produce college football video games. Taking advantage of these agreements, EA Sports produced a wide variety of football video games, including management simulations (*NFL Head Coach* series), action simulations (*Madden NFL* series), and extreme simulations (*NFL Street* series). While EA Sports prospered during this period, many other companies suffered declining sales because of the effects of the new licensing agreements.

By the mid-2000s, EA Sports had assumed a monopolistic hold over the football video game industry. Yet, even EA Sports experienced misfortune by the late 2000s. In 2013, after many lawsuits involving college players, the NCAA, and football video games, EA Sports decided to discontinue its popular *NCAA Football* series (Kirshner 2018). While other companies continue to produce football video games, EA Sports' hold on the market remains resilient. Even with this current decrease in football video game diversity, sports video games remain popular and are often considered a sport in and of themselves. Some sports video game players are even able to receive scholarships to college rewarding their abilities (Dollinger 2018).

Dafna Ester Kaufman

See also: Sports Games

Further Reading

Conway, S. "Systems of Winning: The Sport Simulation." In *Digital Games: Theory and Design: Proceedings of the 2007 Conference Held at Brunel University*. London: Brunel University, 2007.

Dollinger, Arielle. "Video Games Are a Waste of Time? Not for Those with E-

Sports Scholarships." *New York Times*, November 2, 2018. Available at https://www.nytimes.com/2018/11/02/education/learning/video-games-esports-scholarships.html.

Kirshner, Alex. "How Gamers Are Still Keeping 'NCAA Football 14' Alive." SB Nation, July 9, 2018. Available at https://www.sbnation.com/college-football/2018/7/9/17434068/ncaa-football-ea-sports-video-game-return.

Mazique, Brian. "It's Time for 2K Sports to Return to Football." *Forbes*, September 27, 2018. Available at https://www.forbes.com/sites/brianmazique/2018/09/27/its-time-for-2k-sports-to-return-to-football/#4b66481a10c6.

Newman, Michael Z. "The Name of the Game Is Jocktronics: Sport and Masculinity in Early Video Games." In *Playing to Win: Sports, Video Games, and the Culture of Play*, edited by Robert Alan Brookey and Thomas P. Oates, 23–44. Bloomington: Indiana University Press, 2015.

Fortnite

Fortnite is a seminal title in the Battle Royale genre, released by Epic Games as a free-to-play (F2P) game in July 2017. As of 2019, *Fortnite* is one of the most popular games in the West with a significant participatory following on livestreaming sites such as Twitch. Moreover, *Fortnite* has gained significant traction in wider popular culture, with many of its popular livestreamers, such as "Ninja," becoming celebrities in their own right. It has become routine to see high-profile players playing with sports or music celebrities and, in turn, to see these celebrities imitate moves from *Fortnite* when scoring a goal in a soccer match, for example (Alvaraz 2018).

Fortnite first began development in 2011 when it was intended to be a player-versus-environment sandbox survival game to rival *Minecraft* (2009). The major addition Epic Games aimed to make to the sandbox survival genre through *Fortnite* was a third-person shooter element with guns. In July 2017, *Fortnite* was released. However, in the six years that had passed since *Fortnite* first started development, new genres had become popular, and one of the most rapidly growing genres in 2017 was battle royale games.

The premise of a battle royale game is loosely based on the Japanese film and manga of the same name released in 2000. A group of people are dropped on an enclosed island space and must hunt each other down, finding new weapons and armor as they go, until a single team or individual remains. As the game progresses, areas of the island are removed from play, forcing remaining players into conflict. Games typically contain up to one hundred players and last twenty minutes in total, though the game is much shorter for players who are quickly killed. As a game genre, battle royales first began as mods for *Minecraft* and Bohemia Interactive's *Arma 2* (2009). With similarities to many popular livestreaming and esports genres, the premise for battle royale games would be rereleased commercially as stand-alone games with much popular success. The first stand-alone titles to garner popularity were Daybreak Game Company's *H1Z1* (2015) and PubG Corporation's *PlayerUnknown's Battlegrounds* (2017), but

Fortnite's battle royale game mode, released in September 2017, elevated the genre to new heights of cultural significance in the West.

What set *Fortnite* apart from rival battle royale games was a combination of innovations. Its art style featured a brighter and more vibrant palette than rival battle royale games, which made *Fortnite* appeal to a younger player base. The art style was also praised for its diverse array of characters, with different ethnicities, genders, and body types all represented. *Fortnite* also retained the crafting and building mechanics from its original *Minecraft* inspiration, and this element would set it apart from more traditional third-person shooters. Significantly, *Fortnite* was also the first battle royale on release to follow the "fair" model of F2P games first pioneered by Riot Games' *League of Legends* (2009), whereby the game is available in full for free with only aesthetic skins available for sale. It was this combination of innovating aspects to the genre, along with Epic Games' frequent interaction and updates to the game, that propelled *Fortnite* to become one of the most popular games in the West.

A teenaged gamer playing the web-based game *Fortnite*, on January 13, 2019 in Cherkassy, Ukraine. (Vitalii Shcherbyna/Dreamstime.com)

Joshua Jarrett

See also: Shooting Games

Further Reading

Alvarez, E. "Even the World Cup Couldn't Escape the World Cup Fever."

Engadget, July 14, 2018. Available at https://www.engadget.com/2018/07/14/world-cup-goals-fortnite-dance-celebrations/.

France

From the 1990s "French touch" to Ubisoft's international development, video games in France have grown into a major sector of entertainment. During the late 1970s, arcade games and the first home *PONG* systems (such as those from Radiola, Pathé Marconi, and Occitane Electronique) were selling in France, introducing the video game as entertainment in cafés and domestic places. In the 1980s, electronic games on personal computers were the most popular platform for French gamers: Nintendo Game & Watch, or Asian ersatz, distributed in France by Lansay or Ludotronic; the French computer systems Matra Alice, TO7 or MO5; and the American and British standards, Apple II, ZX Spectrum, Commodore 64, Amstrad CPC, Amiga, and Atari 520 or 1040. The first French computer and video game magazines were published in the 1980s, including *Tilt* and *Virus Informatique*, which gave BASIC programs for coding games or testing new applications.

In the late 1980s, after a first attempt by French hi-fi retailer ASD, the Japanese toy company Bandai introduced the Nintendo Entertainment System (NES) into French territory. At the same time, Virgin was selling SEGA systems, such as the SEGA Master System and the SEGA Mega Drive (the Japanese and European names for the SEGA Genesis). Progressively, game companies raised their own subsidiaries to control their distribution in the French market as a component of the European market. Retail companies such as Micromania and Score Game appeared in the early 1990s, as French publishers such as Infogrames, Ubisoft, and Cryo became active in the international marketplace. In the 2000s, Nintendo, Sony, and Microsoft shared the French gaming market, with the Nintendo Wii as the dominant system.

French creativity hit the world during the 1990s with what the international press named the "French touch." Behind this label were game designers and game producers, including Philippe Ulrich (designer of *Captain Blood* [1988], Infogrames), Eric Chahi (*Out of This World* [1991], Delphine Software), Frédérick Raynal (*Alone in the Dark* [1992], Infogrames), Michel Ancel (*Rayman* [1995], Ubisoft), and David Cage (*The Nomad Soul* [1999], Eidos Interactive). The hallmarks of the French touch include an interest in voiceover narration, complex game worlds, and the use of cinematographic techniques such as rotoscoping and motion capture.

Since the early 2000s, the French government and other French institutions have shown a great interest in the video game industry and culture. In 1992, the National Library of France became one of the first international public establishments to compile a collection of digital documents, including video games. During the late 1990s, the first preservation associations, such as MO5, worked on gathering old systems and conserving software, creating some exhibitions and meeting public institutions to found a national museum of video games. The Ministry of Culture honored a few game designers, including Philippe

Ulrich in 1999; Shigeru Miyamoto, Michel Ancel, and Frédérick Raynal in 2006; and Peter Molyneux, Eric Viennot (*In Memoriam* [2003]), and Antoine Villette (*Cold Fear* [2005]) in 2007.

In 2003, the first national school of video games, Enjmin (located in Angoulême), was announced by Prime Minister Jean-Pierre Raffarin. In the academic field, French research work first focused on psychological approaches to video games in the 1990s, after which the fields of sociology, communication, film studies, political science, philosophy, and geography began to take an interest in video games. Nowadays, video games are no longer considered as purely entertainment in France but as a cultural domain and more, even called the Tenth Art, following cinema, which was defined by Riccioto Canudo as the Seventh Art in the 1920s.

Alexis Blanchet

See also: Ubisoft

Further Reading

Blanchet, Alexis. "France." In *Video Games around the World*, edited by Mark J. P. Wolf, 175–192. Cambridge, MA: MIT Press, 2015.

Blanchet, Alexis, and Guillaume Montagnon. *French Touche. Une histoire du jeu vidéo en France (1960–1991)*. Houdan, France: Pix'n Love, 2019.

Free-to-Play Model

Since the early 2000s, the video game industry has gone through major changes with declining segments (console-based and PC-based games) and fast-growing ones (online and mobile games) (De Prato 2014). The original business model of the video game, inspired by the publishers' boxed products (equipment purchase support for a game to install or use on a console), became outdated as video game business models become diverse: pay-per-play, freemium, crowdfunding, bundling, and subscriptions, for example. Online and mobile games are characterized by two major business models: the pay model (subscription is usually the case for massively multiplayer online games [MMOGs]) and the free-to-play (F2P) model. (There is no consensus as to the definition, and although some make a distinction between F2P and freemium [Davidovici-Nora 2014], it does frequently overlap. The notion is attributed to Fred Wilson, a VC entrepreneur, in 2006 [Anderson 2009].) The pay model can be split into the freemium model (with free basic features: free trial period, full version for a fee) and the F2P model (with content made available for free online). In F2P games, the basic game is free, and players can buy optional virtual items and services to enhance the quality of the basic game experience. The F2P business model is now dominating the worldwide market for mobile games (Lila 2019).

The video game hitmaker Zynga sums up the F2P model in the following fashion: "Games should be free. Free games are more social because they're more accessible to everyone. We've also found them to be more profitable. We have created a new kind of customer relationship with new economics—free first, high satisfaction, pay optional" (Zynga Inc. 2011). The assessment of a "free" model being more profitable may seem odd; however, there are some good economic reasons to account for this oddity. The model is built on economies of scale; indeed, hit games make enormous profits: Lila (2019) noted that, in 2018, the F2P game *Fortnite* (2017) made over $390 million just on iOS devices solely from in-app purchases. This is an innovative use of a two-sided market with a segmented pricing (or nonpricing) scheme; most customers will get free services supported by those who are willing to pay. A report by the firm Swrve (a marketing engine for freemium games) provides a snapshot of how mobile gamers monetize: in the month of February 2016, a full 48 percent of monthly revenue derived from the top 10 percent of payers, representing a mere 0.19 percent of total players (Swrve 2016).

Companies such as Zynga, relying on the F2P model, are built around a metrics-driven culture. As games are free (partially or totally), relevant ways to monetize are needed to look for new streams of revenues (microtransactions: virtual items, in-app purchases) and advertising (banner ads, video ads, and product placement). Therefore, data analysis and mastering metrics become pivotal for the business models, which was not the case for boxed games or even for online pay-to-play games. Managing this monetization is key, as revenues rely on a smaller number of players: the so-called whales. User retention is one of the most important performance metrics; it can potentially keep a game running for decades and generate continual revenue (as illustrated by the *Candy Crush* [2012] phenomenon); it is key to monitor user retention in a game-as-a-service.

The Asia-Pacific region has been leading in online and mobile games and pioneering innovative business models. They were an unexpected consequence of piracy, with Chinese game companies (Kshreti 2013, 3; Simon 2015), just like South Korean games companies (Wi 2009), coming up with bold business strategies to circumvent the risk. This led to the creation of the F2P model that dominates, by and large, the Chinese market, the introduction of in-game advertising, and the blooming market of virtual items. Tencent is a pioneering company for social networking and online gaming (Wi 2009) that introduced the model in 2008 for games such as *Dungeon & Fighter* (2005), which became *Dungeon Fighter Online* (2008). Tencent has converted most of its hundreds of millions of social media users into paying customers, mainly for virtual items in games (Simon and Bogdanowicz 2016). The F2P model looks like it is here to stay.

Jean Paul Simon

See also: Industry; Zynga Inc.

Further Reading

Anderson, C. *Free: The Future of a Radical Price*. New York: Hyperion, 2009.

Davidovici-Nora, M. "Paid and Free Digital Business Models Innovations in the Video Game Industry." *Communications & Strategy* no. 94 (2014): 83–102.

De Prato, G. “The Video Games Industry.” In *Digital Media Worlds; The New Economy of Media,* edited by G. De Prato, E. Sanz, and J. P. Simon, 163–179. Oxford, UK: Palgrave, 2014.

Kshetri, Nir. “The Evolution of the Chinese Online Gaming Industry.” 2013. Available at https://www.researchgate.net/profile/Nir_Kshetri/publication/228319290_The_Evolution_of_the_Chinese_Online_Gaming_Industry/links/09e41510a5f1069302000000.pdf.

Lila, Iva. “Will Subscriptions Transform the Mobile Games Market?” Prioridata.com, February 26, 2019. Available at https://airnowdata.com/blog/will-subscriptions-transform-the-mobile-games-market.

Simon, Jean Paul. “The Production and Distribution of Digital Content in China. An Historical Account of the Role of Internet Companies and Videogames.” *Journal of Digital Policy, Regulation and Governance*, forthcoming.

Simon, Jean Paul, and Marc Bogdanowicz. “Catching a Rising Star. Techno-Platforms Study of Companies with High Market Capitalisation (HICAP) Running Global Digital Platforms.” Publications Office of the European Union, 2016. Available at Available at: https://publications.jrc.ec.europa.eu/repository/bitstream/JRC100719/jrc100719.pdf; Part II-Case studies: https://publications.jrc.ec.europa.eu/repository/bitstream/JRC100720/jrc100720.pdf.

Swrve. “The Swrve Monetization Report 2016.” 2016. Available at. https://www.swrve.com/images/uploads/whitepapers/swrve-monetization-report-2016.pdf.

Wi, J. H. *Innovation and Strategy of Online Games*. London: Imperial College Press, 2009.

Zynga Inc. United States Securities and Exchange Commission: Form S-1 Registration Statement, July 1, 2011. Available at https://www.sec.gov/Archives/edgar/data/1439404/000119312511180285/ds1.htm.

Fullerton, Tracy (1965–)

Tracy Fullerton is a game designer and the Electronics Art Endowed Chair in Interactive Entertainment in the University of Southern California Interactive Media & Games Division of the School of Cinematic Arts, where she directs the Game Innovation Lab and was the founding director of the USC Games Program. She is the author of the textbook *Game Design Workshop: A Playcentric Approach to Creating Innovative Games* (2004–19), which is widely used to teach game design at the university level.

Fullerton’s game development projects often use methods and themes from the arts and humanities. She is widely known for her work on *Walden, a game* (2017). After visiting Walden Pond, Fullerton conceived of a game based on Henry David Thoreau’s Walden experiment. Funded by the National Endowment for the Arts and the National Endowment for the Humanities, the resulting game was released for multiple platforms and has been exhibited nationally and internationally. *Walden, a Game* has won numerous awards, including Best Overall Game and Best Educational Game at the Intentional Play Summit, the IndieCade Developer’s

Choice Award, and Game of the Year and Most Significant Impact from Games for Change.

Fullerton served as both game designer and producer of *The Night Journey* (2007, 2018), an experimental art game directed by artist Bill Viola, which has been exhibited internationally. The initial exhibit version of the game was funded by the National Endowment for the Arts and the Annenberg Foundation. The home version of *The Night Journey*, launched in 2018, was funded by a second grant from the National Endowment for the Arts. Fullerton has overseen numerous projects as director of the Game Innovation Lab, including the *Collegeology* suite of games (2009–13); *Reality Ends Here* (2011–present), a pervasive game that introduces first-year students to media making at the USC School of Cinematic Arts; *Life Underground* (2016), a NASA-funded game to teach the scientific method to middle school students; and *Chrono Cards: American Revolution* (2018), an NEH-funded project to develop two card games for the middle school U.S. history curriculum.

Fullerton also founded and served as president of the interactive television company Spiderdance. Spiderdance partnered with MTV for *webRIOT*, a 1999 television game show that incorporated audience participation and competition through a software program. Other Spiderdance projects included the History Channel's *HistoryIQ* and NBC's *The Weakest Link*. Fullerton's career has also included stints as a designer at the interactive media company Synapse, founded by Robert Abel; as a creative director at Interfilm, an interactive film company; and as a founding member of R/GA Interactive.

Jennifer deWinter and Carly A. Kocurek

See also: Contemplative Games; Night Journey, The; Walden, a Game

Further Reading

Fullerton, Tracy. *Game Design Workshop: A Playcentric Approach to Creating Innovative Games*. 3rd ed. New York: CRC Press, Taylor and Francis Group, 2014.

Zungre, Jonathan. "Game Designers in Detail: Tracy Fullerton." Game Center, NYU, September 11, 2012. Available at https://gamecenter.nyu.edu/game-designers-in-detail-tracy-fullerton/.

Encyclopedia of Video Games

Encyclopedia of Video Games

THE CULTURE, TECHNOLOGY, AND ART OF GAMING

SECOND EDITION

VOLUME II: G–P

Mark J. P. Wolf, Editor

GREENWOOD™
An Imprint of ABC-CLIO, LLC
Santa Barbara, California • Denver, Colorado

Copyright © 2021 by ABC-CLIO, LLC

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, except for the inclusion of brief quotations in a review, without prior permission in writing from the publisher.

Library of Congress Cataloging-in-Publication Data

Names: Wolf, Mark J. P., editor.
Title: Encyclopedia of video games : the culture, technology, and art of gaming / Mark J.P. Wolf, editor.
Description: Second edition. | Santa Barbara, California : ABC-CLIO, LLC, [2021] | Includes bibliographical references and index.
Identifiers: LCCN 2021007328 (print) | LCCN 2021007329 (ebook) | ISBN 9781440870194 (set) | ISBN 9781440878640 (v. 1 ; hardcover) | ISBN 9781440878657 (v. 2 ; hardcover) | ISBN 9781440878664 (v. 3 ; hardcover) | ISBN 9781440870200 (ebook)
Subjects: LCSH: Video games—Encyclopedias.
Classification: LCC GV1469.3 .E65 2021 (print) | LCC GV1469.3 (ebook) | DDC 794.803—dc23
LC record available at https://lccn.loc.gov/2021007328
LC ebook record available at https://lccn.loc.gov/2021007329

ISBN: 978-1-4408-7019-4 (set)
978-1-4408-7864-0 (vol. 1)
978-1-4408-7865-7 (vol. 2)
978-1-4408-7866-4 (vol. 3)
978-1-4408-7020-0 (ebook)

25 24 23 22 21 1 2 3 4 5

This book is also available as an eBook.

Greenwood
An Imprint of ABC-CLIO, LLC

ABC-CLIO, LLC
147 Castilian Drive
Santa Barbara, California 93117
www.abc-clio.com

This book is printed on acid-free paper ∞

Manufactured in the United States of America

Contents

List of Entries

Guide to Related Topics

Foreword to the Second Edition

Foreword to the First Edition

Preface

Acknowledgments

A–Z Entries

About the Editor and Contributors

Index

List of Entries

Abbas, Reine
Abstraction
Abzû
Accessibility
Activision
Activision Blizzard
Adaptation
Addiction
Adventure
Adventure Games
Advergames
Advertising
Affordances
Africa
Afroes
Angry Birds
Animal Crossing Series
Animation (Computer)
Animation (Hand-Drawn)
Apocalypse
Apple Bandai Pippin
Apps (Applications)
Arakawa, Minoru
Arcade Cabinet Art
Arcade Games
Arcades
Archives
Argentina
Art
Art, Video Games as
Artificial Intelligence
Asheron's Call

Association for UK Interactive Entertainment
Atari
Atari, Inc. v. North American Philips Consumer Electronics Corp.
Atari 5200
Atari Jaguar
Atari Lynx
Atari 7800 ProSystem
Atari VCS 2600
Audio (Dynamic, Interactive, and Adaptive)
Augmented Reality
Australia
Avatars
AY-3-8500 Chip
Baer, Ralph H.
Bailey, Dona
Ball-and-Paddle Games
Bally
Battlezone
"Beating" a Game
Bemani
Biomechanics
BioShock Series
Board Games
Boss Keys
Brazil
Brown v. Entertainment Merchants Association
Bulletin Board Systems
Bungie
Bushnell, Nolan
Caillois, Roger
Call of Duty Series
Canada
Candy Crush Saga
Capcom
Capcom USA v. Data East
Careers
Cartridges
Casual Games
CD-ROM-Based Games
Censorship
Cheating
Checkpoints
Chen, Jenova
Chile
China
Cinematronics
City of Mesquite v. Aladdin's Castle, Inc.
Civic Engagement

Co-Creativity
Codemasters
Cognition
Coleco
ColecoVision
Collecting Video Games
Colombia
Comics
Computer Games
Computer Games Magazine
Computer Gaming World
Computer Space
Console-Based Games
Contemplative Games
Controllers
Conventions
Cooperative Gameplay
Cow Clicker
Crash of 1977
Crash of 1983
Crawford, Chris
Cuphead
Cutscenes
CVC GameLine Master Module
Cyan Worlds
Czech Republic
Dance Dance Revolution
Data East USA v. Epyx
Dating Sims
Death and Resurrection
DECO Cassette System
Defender
Deludic Play
Demoscenes
Denmark
Digital Games Research Association
Digital Games Research Center
Dimensionality
DOOM
Dual In-Line Parallel Switches
Duncan, Theresa
DVD and Blu-Ray Disc Games
Dystopian Games
Easter Eggs
Education (General)
Education (Job Training)
Education (Religious)
Egypt

Elder Scrolls, The Series
Electromechanical Games
Electronic Arts
Emotion
Emulators
Entertainment Software Association
Entertainment Software Rating Board
Environmentalism
Erikawa, Keiko
Esports
Europe (Central and Eastern)
Europe (Western)
EVE Online
EverQuest
Experimental Games
Failure
Fairchild/Zircon Channel F
Fallout Series
Fandom
FarmVille
Femininity
FIFA Series
Fighting Games
Film
Finland
“First” Video Game
First-Person Shooters
Football Games
Fortnite
France
Free-to-Play Model
Fullerton, Tracy
Galaxy Game
Gambling
Game, Definition of
Game Design
Game Developers Conference
Game Engines
Game Feel
Game Genealogies
Game Guides
Game Informer
Game Manuals
Game Modifications
Game Studies
Game Transfer Phenomena
Game Writing
Gamergate

Gamers Outreach Foundation
Games, Philosophical Critique of
Games and Culture
Games Done Quick
Gamification
Garriott, Richard
GCE/Milton Bradley Vectrex
Gender
Generations of Technology
Germany
Gestural Interfaces
Girls' Games
Githuku-Shongwe, Anne
Glitches
Global Reach of Games
God Games
Gold Farming
Google Play (Portal)
Grand Theft Auto Series
Graphics
Hacking
Handheld Games
Hawkins, Trip
HDTV Games
Health (Mental)
Health (Physical)
Heineman, Rebecca
Help Function
Hip-Hop
History of Video Games
HoloLens
Homebrew Games
Hong Kong
Houser, Sam and Dan
HTC Vive
Huizinga, Johan
Hungary
I, Robot
Iceland
id Software
Idea for Home Video Games
Immersion
Immersion v. Sony
Incremental Games
India
Indonesia
Industry
Infocom

Interactive Movies
Interface
International Center for the History of Electronic Games
International Game Developers Association
Ireland
Italy
JAMMA Standard
Japan
Jensen, Jane
Jordan
Journalism
Joysticks
Killer List of Videogames
King of Fighters, The Series
Kirby Series
Kirschenbaum v. Electronic Arts
Kojima, Hideo
Konami
Language
Laserdisc Games
Latin America
Latinos and Video Games
Laurel, Brenda
Lebanon
Legend of Zelda, The Series
LEGO Video Games
Let's Play Videos
Localization
Ludology
Machinima
Magic Circle
Magnavox Odyssey
Mainframe Games
MAME
Maps
Mario Kart Series
Mario Series
Masculinity
Massively Multiplayer Online Role-Playing Games
Mattel Intellivision
Maxis Software
McGonigal, Jane
Meier, Sid
Merchandising
Meridian 59
Metagames
Metal Gear Series
Metalepsis

Metaphor
Metatextuality
Metroid Series
Mexico
MicroProse
Microsoft Xbox
Microsoft Xbox One
Microsoft Xbox 360
Middle East
Midway Games
Midwest Gaming Classic
Military Use of Games
Minecraft
Minigames
Mixed Reality
Mobile Games
Molyneux, Peter
Morality and Ethics
Mortal Kombat
Motion Capture and Motion Control
Multiuser Domains
Museum of the Game
Music
Myst
Namco
Narrative
Navigation (Spatial)
Navigation (Temporal)
NCSoft
NEC PC-Engine/TurboGrafx-16
Neo•Geo
NetEase
Netherlands, The
New Zealand
Newsgames
Night Journey, The
Nintendo
Nintendo DS
Nintendo Entertainment System/Nintendo Famicom
Nintendo Game Boy
Nintendo GameCube
Nintendo 64
Nintendo Switch
Nintendo Virtual Boy
Nintendo v. Blockbuster Video
Nintendo Wii
Nintendo Wii U
Non-Player Characters

Norway
Oculus Rift
Online Games
Ontology
Open-Source Software
Oregon Trail, The
Outsourcing
OUYA
Overwatch
Packaging
Pac-Man
Pan European Game Information System
Paradox Interactive
Patent #2,455,992
PC Bangs
Performance
Peripherals
Persistent Games
Pervasive Games
Phenomenology
Philips CD-i
Piracy in China
Platforms
Play
Play Meter Magazine
Playrix
Pokémon GO
Poland
PONG
Portal Series
Portugal
Preservation
Procedural Generation
Procedural Rhetoric
Psychodynamics
Psychological Research on Video Games
*Q*bert*
Qix
Quick Time Events
Quraish
Race
Racing Games
Reading Video Game Imagery
Reception Theory
Reddy, Siobhan
Remediation
Replay and Repetition
RePlay Magazine

Representations of Video Games in Hollywood Cinema
Resident Evil Series
Resolution
Resource Management Games
Retrogaming
Rhetoric
Rhythm and Dance Games
Ritual
Riven
Rockstar Games
Rohrer, Jason
Role-Playing Games
Romania
Romero, Brenda
Ross, Bonnie
Rules
Russia
Santiago, Kellee
Saudi Arabia
Save Function
Scepter of Goth
Scrolling
SEGA
SEGA CD/Mega-CD
SEGA Dreamcast
SEGA Game Gear
SEGA Genesis/SEGA Mega Drive
SEGA Master System/SEGA Mark III
SEGA Saturn
Serious Games
Shareware Games
Shaw, Carol
Shooting Games
Sierra Entertainment
Silent Film
Silicon Knights v. Epic Games
Sim Series
Sims, The Series
Simulation Games
Singapore
SNK (Shin Nihon Kikaku) Playmore
Social Media
Sony Corporation
Sony PlayStation
Sony PlayStation 2
Sony PlayStation 3
Sony PlayStation 4
Sony v. Bleem

Sound
Sound Technology
South Africa
South Korea
Space (Narrative)
Space (Visual)
Space Invaders
Spacewar!
Spain
Spector, Warren
Speedruns
Spirituality
Sports Games
Square Enix
StarCraft
Stealth Games
Steam (Portal)
Strategy Games
Streaming
Street Fighter II
Strong National Museum of Play
Subcreation
Suicide Battery
Super Nintendo Entertainment System/Super Famicom
Supergiant Games
Survival Horror Games
Sustainability
Sweden
Switzerland
Syria
Television
Tempest
Tencent Holdings Ltd.
Tetris
Text Adventure Games
Thailand
thatgamecompany
3-D Hardware
3DO Interactive Multiplayer
Time
Tool-Assisted Superplay
Touchscreen Games
Treasure Co. Ltd.
Turkey
Twin Galaxies
Twitch
Ubiquitous Games
Ubisoft

Ultima Series
Unit Operations
United Arab Emirates
United Kingdom
United States of America
Universal City Studios, Inc. v. Nintendo Co. Ltd.
Unlockable Games
Unreal Engine
Uruguay
Vector Games
Vectorbeam
Video Game Literacy
Video Game Movies
Video Game Museums
Video Game Novels
Video Game Studies
Video Games and Literature
Video Games as Collectibles
Video Games within Video Games
Videotopia
Vintage Arcade Preservation Society
Violence
Virtual Pets
Virtual Reality
Visual Literacy
Visual Novels
Walden, a Game
Walkthroughs
War
Warnets
Web-Based Games
Weisbecker, Joyce
West and Zampella v. Activision
Wii Sports
Williams (Company)
Williams, Roberta
World (of a Video Game)
World Cyber Games
World of Warcraft
World Video Game Hall of Fame
World War II in Video Games
Wright, Will
XaviXPORT
Xbox Game Studios
Xiaobawang System
XNA
Yokoi, Gunpei
YouTube

Zapak (Portal)
Z-Axis Depth
Zaxxon
Zeebo
Zen Mode
Zynga Inc.

Guide to Related Topics

Associations and Institutions

Association for UK Interactive Entertainment (UKIE)
Digital Games Research Association (DiGRA)
Digital Games Research Center (DIGAREC)
Entertainment Software Association (ESA)
Entertainment Software Rating Board (ESRB)
Game Developers Conference (GDC)
Gamers Outreach Foundation
Games Done Quick (GDQ)
International Center for the History of Electronic Games (ICHEG)
International Game Developers Association (IGDA)
Killer List of Videogames (KLOV)
Midwest Gaming Classic (MGC)
Museum of the Game (MOG)
Pan European Game Information (PEGI) System
Strong National Museum of Play
Twin Galaxies
Video Game Museums
Videotopia
Vintage Arcade Preservation Society (VAPS)
World Cyber Games
World Video Game Hall of Fame

Business and Industry

Arcades
Archives
Atari, Inc. v. North American Philips Consumer Electronics Corp.

Brown v. Entertainment Merchants Association
Capcom USA v. Data East
Careers
City of Mesquite v. Aladdin's Castle, Inc.
Crash of 1977
Crash of 1983
Data East USA v. Epyx
Esports
Free-to-Play Model
Gambling
Gamergate
Gamification
Gold Farming
Immersion v. Sony
Industry
Kirschenbaum v. Electronic Arts
Localization
Merchandising
Nintendo v. Blockbuster Video
Outsourcing
Packaging
Patent #2,455,992
PC Bangs
Piracy in China
Preservation
Silicon Knights v. Epic Games
Sony v. Bleem
Sustainability
Universal City Studios, Inc. v. Nintendo Co. Ltd.
Warnets
West and Zampella v. Activision

Companies

Activision
Activision Blizzard
Afroes
Atari
Bally
Bemani
Bungie
Capcom
Cinematronics
Codemasters
Coleco
Cyan Worlds

Electronic Arts (EA)
Google Play (Portal)
id Software
Infocom
Konami
Maxis Software
MicroProse
Midway Games
Namco
NCSoft
NetEase
Nintendo
Paradox Interactive
Playrix
Rockstar Games
SEGA
Sierra Entertainment
SNK (Shin Nihon Kikaku) Playmore
Sony Corporation
Square Enix
Steam (Portal)
Supergiant Games
Tencent Holdings Ltd.
thatgamecompany
3DO Interactive Multiplayer
Treasure Co. Ltd.
Twitch
Ubisoft
Vectorbeam
Williams (Company)
YouTube
Zapak (Portal)
Zynga Inc.

Games

Abzû
Adventure
Angry Birds
Animal Crossing Series
Asheron's Call
Battlezone
BioShock Series
Call of Duty Series
Candy Crush Saga
Computer Space

Cow Clicker
Cuphead
Dance Dance Revolution (DDR)
Defender
DOOM
Elder Scrolls, The Series
EVE Online
EverQuest
Fallout Series
FarmVille
FIFA Series
Fortnite
Galaxy Game
Grand Theft Auto Series
I, Robot
King of Fighters, The Series
Kirby Series
Legend of Zelda, The Series
LEGO Video Games
Mario Kart Series
Mario Series
Meridian 59
Metal Gear Series
Metroid Series
Minecraft
Mortal Kombat
Myst
Night Journey, The
Oregon Trail, The
Overwatch
Pac-Man
Pokémon GO
PONG
Portal Series
*Q*bert*
Qix
Quraish
Resident Evil Series
Riven
Scepter of Goth
Sim Series
Sims, The Series
Space Invaders
Spacewar!
StarCraft
Street Fighter II
Tempest
Tetris

Ultima Series
Walden, a game
Wii Sports
World of Warcraft (WoW)
Zaxxon

Other Media

Animation (Computer)
Animation (Hand-Drawn)
Apps (Applications)
Arcade Cabinet Art
Art
Art, Video Games as
Augmented Reality (AR)
Board Games
Comics
Computer Games Magazine
Computer Gaming World
Electromechanical Games
Esports
Film
Game Informer
Game Studies
Games and Culture
Hip-Hop
Journalism
Let’s Play Videos
Machinima
Mixed Reality (MR)
Music
Open-Source Software
Play Meter Magazine
Replay Magazine
Silent Film
Social Media
Streaming
Television
Video Game Literacy
Video Game Movies
Video Game Novels
Video Games within Video Games
Virtual Reality (VR)
YouTube

People

Abbas, Reine
Arakawa, Minoru
Baer, Ralph H.
Bailey, Dona
Bushnell, Nolan
Caillois, Roger
Chen, Jenova
Crawford, Chris
Duncan, Theresa
Erikawa, Keiko
Fullerton, Tracy
Garriott, Richard
Githuku-Shongwe, Anne
Hawkins, Trip
Heineman, Rebecca
Houser, Sam and Dan
Huizinga, Johan
Jensen, Jane
Kojima, Hideo
Laurel, Brenda
McGonigal, Jane
Meier, Sid
Molyneux, Peter
Reddy, Siobhan
Rohrer, Jason
Romero, Brenda
Ross, Bonnie
Santiago, Kellee
Shaw, Carol
Spector, Warren
Weisbecker, Joyce
Williams, Roberta
Wright, Will
Yokoi, Gunpei

Regions

Africa
Argentina
Australia
Brazil
Canada
China
Colombia

Czech Republic
Denmark
Egypt
Europe (Central and Eastern)
Europe (Western)
Finland
France
Germany
Hong Kong
Hungary
Iceland
India
Indonesia
Ireland
Italy
Japan
Jordan
Latin America
Lebanon
Mexico
Middle East
New Zealand
Netherlands, The
Norway
Poland
Portugal
Romania
Russia
Saudi Arabia
Singapore
South Africa
South Korea
Spain
Sweden
Switzerland
Syria
Thailand
Turkey
United Arab Emirates (UAE)
United Kingdom
United States of America
Uruguay

Systems

Apple Bandai Pippin

Atari 5200
Atari Jaguar
Atari Lynx
Atari 7800 ProSystem
Atari VCS 2600
ColecoVision
Fairchild/Zircon Channel F
GCE/Milton Bradley Vectrex
HoloLens
HTC Vive
Magnavox Odyssey
Mattel Intellivision
Microsoft Xbox
Microsoft Xbox One
Microsoft Xbox 360
NEC PC-Engine/Turbografx-16
Neo•Geo
Nintendo DS
Nintendo Entertainment System (NES)/Nintendo Famicom
Nintendo Game Boy
Nintendo GameCube
Nintendo 64
Nintendo Switch
Nintendo Virtual Boy
Nintendo Wii
Nintendo Wii U
Oculus Rift
OUYA
Philips CD-i
SEGA CD/Mega-CD
SEGA Dreamcast
SEGA Game Gear
SEGA Genesis/SEGA Mega Drive
SEGA Master System/SEGA Mark III
SEGA Saturn
Sony PlayStation
Sony PlayStation 2
Sony PlayStation 3
Sony PlayStation 4
Super Nintendo Entertainment System (SNES)/Super Famicom
XaviXPORT
Xiaobawang System
Zeebo

Technology

Artificial Intelligence (AI)
Audio (Dynamic, Interactive, and Adaptive)
Augmented Reality (AR)
AY-3-8500 Chip
Biomechanics
Boss Keys
Bulletin Board Systems (BBSs)
Cartridges
CD-ROM-Based Games
Checkpoints
CVC GameLine Master Module
DECO Cassette System
Dual In-Line Parallel (DIP) Switches
Easter Eggs
Electromechanical Games
Emulators
Game Design
Game Engines
Game Modifications
Generations of Technology
Gestural Interfaces
Glitches
Gold Farming
Graphics
Hacking
Help Function
Interface
JAMMA Standard
Joysticks
MAME
Mixed Reality (MR)
Motion Capture and Motion Control
Multiuser Domains (MUDs)
Open-Source Software
Peripherals
Platforms
Preservation
Procedural Generation
Quick Time Events (QTEs)
Resolution
Save Function
Scrolling
Sound Technology
Speedruns
Streaming
Suicide Battery
Sustainability
3-D Hardware

Tool-Assisted Superplay (TAS)
Touchscreen Games
Unreal Engine
Vector Games
Video Game Museums
Virtual Reality (VR)
XNA
Zen Mode

Theoretical Concerns

Abstraction
Accessibility
Adaptation
Addiction
Advertising
Affordances
Apocalypse
Arcades
Art
Art, Video Games as
Audio (Dynamic, Interactive, and Adaptive)
Augmented Reality (AR)
Avatars
“Beating” a Game
Biomechanics
Censorship
Cheating
Civic Engagement
Co-Creativity
Cognition
Collecting Video Games
Controllers
Conventions
Cooperative Gameplay
Cutscenes
Death and Resurrection
Deludic Play
Demoscenes
Dimensionality
Education (General)
Education (Job Training)
Education (Religious)
Emotion
Environmentalism
Failure

Fandom
Femininity
“First” Video Game
Game, Definition of
Game Design
Game Feel
Game Genealogies
Game Guides
Game Manuals
Game Modifications
Game Transfer Phenomena
Game Writing
Games, Philosophical Critique of
Gamification
Gender
Gestural Interfaces
Global Reach of Games
Graphics
Health (Mental)
Health (Physical)
Help Function
History of Video Games
Idea for Home Video Games
Immersion
Interface
Language
Latinos and Video Games
Ludology
Machinima
Magic Circle
Maps
Masculinity
Metagames
Metalepsis
Metaphor
Metatextuality
Military Use of Games
Mixed Reality (MR)
Morality and Ethics
Narrative
Navigation (Spatial)
Navigation (Temporal)
Non-Player Characters (NPCs)
Ontology
Performance
Phenomenology
Play
Procedural Rhetoric

Psychodynamics
Psychological Research on Video Games
Race
Reading Video Game Imagery
Reception Theory
Remediation
Replay and Repetition
Representations of Video Games in Hollywood Cinema
Retrogaming
Rhetoric
Ritual
Rules
Save Function
Sound
Space (Narrative)
Space (Visual)
Speedruns
Spirituality
Subcreation
Sustainability
Time
Unit Operations
Video Game Studies
Video Games as Collectibles
Violence
Virtual Reality (VR)
Visual Literacy
Walkthroughs
War
World (of a Video Game)
World War II in Video Games
Z-Axis Depth
Zen Mode

Types of Games

Adventure Games
Advergames
Arcade Games
Ball-and-Paddle Games
Board Games
Casual Games
CD-ROM-Based Games
Computer Games
Console-Based Games
Contemplative Games

Dating Sims
DVD and Blu-Ray Disc Games
Dystopian Games
Electromechanical Games
Esports
Experimental Games
Fighting Games
First-Person Shooters (FPSs)
Football Games
Girls' Games
God Games
Handheld Games
HDTV Games
Homebrew Games
Incremental Games
Interactive Movies
Laserdisc Games
Mainframe Games
Massively Multiplayer Online Role-Playing Games (MMORPGs)
Minigames
Mobile Games
Newsgames
Online Games
Persistent Games
Pervasive Games
Racing Games
Resource Management Games
Rhythm and Dance Games
Role-Playing Games (RPGs)
Serious Games
Shareware Games
Shooting Games
Simulation Games
Sports Games
Stealth Games
Strategy Games
Survival Horror Games
Text Adventure Games
Touchscreen Games
Ubiquitous Games
Unlockable Games
Vector Games
Virtual Pets
Visual Novels
Web-Based Games

G

Galaxy Game

In the early 1970s, several influential projects were inspired by MIT's *Spacewar!* (1962). For example, Nolan Bushnell began working on *Computer Space* (1971), whereas two years earlier, in 1969, Rick Blomme wrote a two-player version of *Spacewar!* for the Programmed Logic for Automatic Teaching Operations (PLATO) time-sharing system at the University of Illinois. A common element in these projects was the goal of creating a competitive multiplayer game like *Spacewar!* that could be deployed in promising new environments for computer or video games, such as arcades or online networks.

At Stanford University, a recently graduated student from the Stanford Artificial Intelligence Laboratory (SAIL), Bill Pitts, and his friend Hugh Tuck began work on a coin-operated ("coin-op") version of *Spacewar!* during the summer of 1971. *Galaxy Game* was developed for the newly released PDP 11/20, DEC's first 16-bit computer. DEC had fit the PDP 11 into a relatively small box and listed it for a mere $20,000, thereby hoping to open "new markets and new applications" (Pearson 1992). Pitts and Tuck saw an opportunity and formed a company called Computer Recreations. They acquired the low-end version of the PDP-11 for only $13,000 and reprogrammed the PDP-10 version of *Spacewar!* so that it would run on this machine. Including a Hewlett-Packard 1300A electrostatic vector display, walnut veneer cabinet, and other parts, their total expenses came to roughly $20,000. The *Galaxy Game* was faithful not only to *Spacewar!*, having been developed from this game's software code, but also to the player community (university students and computer engineers) and technical configuration (software code, vector displays, timesharing, etc.) that had produced the original game.

In September 1971, Pitts and Tuck installed *Galaxy Game* in Stanford's student union, two months before the release of Bushnell's *Computer Space*. It therefore appears to be the first installed coin-op video game, whether based on computer or television technology. A later version of the game that supported up to four monitors (eight players) remained at the same location until 1979. A restored version of *Galaxy Game* was displayed between 1997 and 2000 in the Gates Computer Science Building at Stanford University and is currently available at the Computer History Museum in Mountain View, California.

Henry Lowood

See also: *Computer Space*; *Spacewar!*

Further Reading

Lowood, Henry. "Video Games in Computer Space: The Complex History of *PONG*." *IEEE Annals in the History of Computing* (July–September 2009): 5–19.

Pearson, Jamie Parker, ed. *Digital at Work: Snapshots from the First Thirty-Five Years*. Burlington, MA: Digital Equipment, 1992, 58, 65.

Pitts, Bill. "The Galaxy Game." Computer History Exhibits website (Stanford University), October 29, 1997. Available at http://www-db.stanford.edu/pub/voy/museum/galaxy.html.

Gambling

Intersections between gambling and digital games have increased exponentially since the mid-1990s, when online casinos featuring games such as digital poker, roulette, and slots were made available. Gambling is a cultural and social activity that involves the staging of a random event or the anticipation of an unknown result on which two or more parties place a bet on the outcome. One of the requirements for a game to be considered gambling is the prevalence of chance over skill in how the winner is determined. Outcomes on some forms of gambling, such as roulette and slots, are determined by pure chance, while games such as poker also involve a set of skills (e.g., bluffing, in the case of poker). Gambling is generally mediated by a third party, commonly referred to as "the house." The third party establishes the rules and redistributes the stake when the outcome is produced. Traditional gambling games include include roulette, slot machines, lottery, lotto, bingo, and poker. Up until the 1970s, random outcomes were mostly generated mechanically. For example, the mechanical roll of reels in slot machines (also known as fruit machines, one-armed bandits, and pokies) determined the winning combination. In roulette, a board is spun mechanically, and balls fall into particular slots.

Since the late 1970s, electronic and digital means have been used to produce random results. Today, hundreds of gambling games use an algorithm known as *random number generator* (RNG) to allocate winners. This technological and cultural shift has put the spotlight on the gambling industry, and whether randomness can truly be achieved digitally is still debated. In parallel, the popularization of the internet and other digital networks has resulted in the creation and popularization of online casinos and gambling apps. The rise of the online and mobile gambling industry has tightened the links between gambling and digital game communities, practices, and platforms. For instance, one of the pioneers of the mobile games sector, Zynga, has released social casino games (games in which gambling situations are simulated, as there is no monetary stake, and the randomness of the game is not fully guaranteed) such as *Zynga Poker* (2007) and *Hit It Rich!* (2013), some of which are branded with popular culture phenomena, such as *Game of Thrones: Slots Casino* (2019). At the same time, traditional gambling institutions such as Caesars Entertainment and the slot machine manufacturer Aristocrat have acquired social casino and mobile game start-ups, such as Product Madness, with critics pointing to a grooming of future gamblers.

The cross-pollination between gambling and digital games also permeates platform design on both ends. Online poker sites incorporate features such as avatars, leaderboards, and tokens—elements traditionally associated with video games. Casino slot machines are increasingly like video games, with some models, such as *Catapult King* (2015), *Beat Square* (2017), and *Seinfeld* (2018), developed by video game company Konami, including skill-based minigames. Likewise, two best-selling games, *Star Wars: Battlefront II* (2017) and *Destiny 2* (2017), accept payment for loot box features where players can win random prizes, which blurs the divide between gaming and gambling.

César Albarrán-Torres

Further Reading

Albarrán-Torres, César. *Digital Gambling: Theorizing Gamble-Play Media*. New York: Routledge, 2018.

Goggin, J. "Regulating (Virtual) Subjects: Finance, Entertainment and Games." *Journal of Cultural Economy* 5, no. 4 (2012): 441–456.

Schüll, N. D. *Addiction by Design: Machine Gambling in Las Vegas*. Princeton, NJ: Princeton University Press, 2012.

Game Boy. *See* Nintendo Game Boy

Game, Definition of

At first glance, it might seem that defining the word *game* would be a foundational issue for video game studies. In practice, though, it makes more sense to view this act of definition as a foundational claim in an argument. Within a complex, interdisciplinary field experiencing an influx of practitioners from other disciplines, the act of defining *game* is a rhetorical strategy. It is a way to recognize one's assumptions carried over from previous study, a way of constraining the following discussion, and sometimes a way of claiming that one's writing is itself foundational.

Katie Salen and Eric Zimmerman begin their exhaustive introductory text to the study of game design, *Rules of Play*, with a justification for their focus on definitional claims. They hold that building a stable vocabulary "establishes a critical discourse" that facilitates training, generational transfer, audience-building, and a buffer against criticism (Salen and Zimmerman 2003, 2–3). They see definitions not as objective truths but as tools for the work of designers and scholars. Salen and Zimmerman execute a comparative study of the efforts of eight previous writers to define the term that span the twentieth century (Salen and Zimmerman 2003, 73–80). This creates a matrix of elements highlighting those aspects of *game* that tend to repeat across disciplines.

Perhaps the only nearly universal inclusion in contemporary definitions of *game* is its rule-based nature. Even a number of authors that interpret games as a form of symbolic textual artifact recognize the fact that, at their core, games are composed of procedures for establishing a game's space, permitting certain actions, and specifying what results those actions will have on the current game state (e.g., see Geertz 1973, 421–432, 437–441). All other clauses in a definition of *game* seem to be important primarily for the purpose of distinguishing games from alternative modes of play (e.g., drama, puzzles, and "free" play) and other rule-based systems (e.g., natural law and social law).

Salen and Zimmerman finish their study by condensing the matrix, "whittling away the unnecessary bits," to formulate their own definition: "A game is a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome" (Salen and Zimmerman 2003, 80). Their general agenda is to remove all aspects of the definition that they see as contentious, ideological, or experiential. The result is as democratic a definition as any, but it is possible that their whittling of the unnecessary may sterilize what makes each source definition truly interesting.

Of the authors surveyed in *Rules of Play*, only Greg Costikyan explicitly refers to games as works of art. Although one can understand how Salen and Zimmerman would want to remove this outlier from their definition, it is important to question exactly why Costikyan would include it in his own. As the years since the writing of *Rules of Play* have shown, the formal classification of games as expressive works has become a major issue of contention within the United States—to pick an obvious example, the question of whether video games have constitutional protection as acts of speech was raised in 2010's *Brown v. Entertainment Merchants Association*. Furthermore, the definitional status of games as art is something that a number of developers in many countries take personally, reiterating the need to sometimes look beyond the formalist construction of words.

One aspect of some definitions of *game* to recently undergo major revision is Johan Huizinga's "magic circle" of play, holding that games create a protected space separate from the ordinary world (Huizinga 1971, 10). Vestigial notions derived from specific play communities become abstracted over time, and we can see that the contemporary idea of a game's necessary artificiality is derived from earlier concepts such as that of the magic circle. The common element between these two formulations is the emphasis on a reduction of real-world consequences within the space of play, or what James Paul Gee calls "psychosocial moratorium" (Gee 2007, 59). Mia Consalvo argues, against a definitional artificiality and the magic circle, that the ordinary rules of life do apply in games, "but in addition to, in competition with, other rules and in relation to multiple contexts" (Consalvo 2009, 416).

Another point of contention is whether a game must be entered into voluntarily. By removing this specification, one muddies the waters between games and other procedural systems, such as legal, political, and economic constructs, that are often entered into involuntarily. Although recent examples from the genre of alternate reality games (ARG) show that it is sometimes the case that players can stumble upon a game without complete knowledge that they are participating, it is a valid question whether this participation can actually be called "gameplay" rather than whatever it is these would-be players think they are doing—arguing on web forums, solving puzzles, piecing together a story, and so on. The same question holds in the case of someone being forced to play a game.

The question of whether or not a "quantifiable outcome" is a necessary element of the definition has also arisen in a number of recent debates. One traditional view is that the inclusion of a quantifiable outcome is what separates a game from a toy or from informal play. And in 2010, the Notgames Initiative banded together, seeking an alternative to the overwhelming number of video games that heavily emphasize explicit goal setting and win/loss conditions. Yet, it is by no means clear that someone playing with a toy might not formulate goals and a quantifiable outcome nor that a digital artifact fitting all other common specifications for being a game suddenly becomes "not a game" simply because it does not distinguish winning from losing.

Finally, we might ask whether we can identify a hard definitional difference between *game* and *video game*. Many authors simply recognize that the computer is able to keep better track of complex game states, provide instant feedback for player action, and connect players across the globe. On the other hand, Miguel Sicart asserts a single element to clearly distinguish the two: "When games use a computer to uphold the rules, it is not possible to discuss the rules during play" (Sicart 2009, 27). This means that traditional games feature conventional enforcement of rules by the players, whereas computers materially enforce the rules as specified in code, altering gameplay both formally and experientially.

Simon Ferrari

Further Reading

Brown v. Entertainment Merchants Association. *SCOTUSblog*, 2010. Available at http://www.scotusblog.com/case-files/cases/eanf/.

Consalvo, Mia. "There Is No Magic Circle." *Games and Culture* 4, no. 4 (2009): 408–417.

Gee, James Paul. *What Video Games Have to Teach Us about Learning and Literacy*. New York: Palgrave MacMillan, 2007.

Geertz, Clifford. *The Interpretation of Cultures*. New York: Basic Books, 1973.

Huizinga, Johan. *Homo Ludens: A Study of the Play-Element in Culture*. Boston: Beacon Press, 1971.

Salen, Katie, and Eric Zimmerman. *Rules of Play: Game Design Fundamentals*. Cambridge, MA: MIT Press, 2003.

Sicart, Miguel. *The Ethics of Computer Games*. Cambridge, MA: MIT Press, 2009.

Game Design

Game design is the conception and realization of interactive systems that produce contexts for strategic and quantitative outcomes. The natural design activity, present in many professional activities, is a driving force for innovation and change in our societies.

In the mid-eighteenth century, the two meanings of *design*, suggesting both the preproduction and the development phases of an artifact's creation through design practice, were established in the French language: *dessein* (literally "purpose," the idea) was dissociated from *dessin* ("drawing," as a recognized art practice). *Design*, which goes back to the Latin *de* and *signare* (to mark out, set apart, or give significance by assigning it to a use, user, or owner), can then be understood as a sense-making activity.

The practice of game design is the design of systems of meaning, established by a set of rules and procedures to apply them. This explains why game design is considered a second-order design problem; players enacting those rules are engaged in the experience of play, which the game designer only crafts indirectly. However, that the rules do not formally define a player's overarching gameplay experience does not imply that those rules cannot fashion the player's informal experience (i.e., experiences that are not a part of the official, prescribed, or customary way of doing things): for example, through aesthetics, thematization, or suggestions about specific play practices, such as cheating or metagaming.

Graphic designers drawing video game art. (Evgeniy Shkolenko/Dreamstime.com)

Pragmatically, in the video game industry, the most essential thing that a game designer does is to provide a description of what the game should be like for the development team that will collaboratively produce a new video game. The game designer's aim, therefore, is the communication of a specific game design proposal or game design document. This design must be fluid; like a living system, a game transforms over the course of its development cycle. This upkeep of the game documentation and the promotion of a communal vision of the game project is often the duty of the game designer—if a creative director does not assume this responsibility.

A game designer may draw concept sketches, supply art assets, and even design part or all of the game world, building game levels. Especially in small development teams, game designers can also execute a wide variety of tasks on a game project and contribute to the programming, management, and production of a video game. However, their central concern always remains the same: to create the form of the gameplay and interaction that differentiates the video game medium from other media. Briefly defined, *gameplay* is the degree and nature of the interactivity that a game includes. Usually repeated over and over throughout the game, the elemental activities of the player can be decomposed in experiential building blocks called *core mechanics*. The gameplay procured is often a basis for the formation of player-driven communities. It does not consist of how the game's world is represented graphically or what game engine is used to render that world, even if technology plays an important role in determining the nature and qualities of the game's spaces. Game design requires the conception of a possibility space that is concretized through the design of both a system of rules and an organized space delimited by boundaries within which the game is played in relative freedom. Another key task of the game designer is to define the win-and-loss states that indicate what must be achieved to close the game—and a quantifiable outcome necessary to consider it a game, according to traditional definitions. The interaction between the player and an input device allows the player to control elements within this definite game space.

Player interaction and interface are modeled on three levels: human-to-technology interaction, human-to-game interaction, and human-to-human interaction. These interactions are defined by rules that describe what happens when different components interact during the game sessions. Game components are resources: commodities of limited availability with fixed values, such as money, population, land, and health. In some games, resources are part of economic systems that do not always refer to currency but to large collections of items that form the game system.

A highly interdisciplinary practice, game design involves collaboration between a large team of expert designers in visual design, sound design, and production design as well as programmers and writers. Modern video games are complex and laborious to create. On the other hand, the design of smaller indie games, mobile games, and casual games may encourage a jack-of-all-trades design practice in tightly knit design teams. Accordingly, game design requires a broad range of artistic and technical expertise as well as good writing and collaborative skills. Game designers must speak the "languages" of many fields and learn, integrate, and share information with their colleagues. This allows game designers to see the possibilities and constraints of their design to receive feedback—as it will become increasingly difficult to see their creation objectively throughout the game development—all while maintaining an inspiring team spirit.

The design of a game, as with any other product of human culture, is about understanding initial limitations and then turning those constraints into advantages that drive forward the design process, where problems and solutions often develop together. A game is designed through an iterative design process: a sequence of modifications to the rules and behaviors of game components following a cycle of modeling, play testing, and modifying after analysis. Through iterations, game designers, acting as advocates for the players, must attain the right balance among challenge, choice, and fun. One way game designers balance the strategic choices players have in games is through the use of degrees of randomness. The amount of challenge and the difficulty of the obstacles a player must overcome to reach the goals set by the game rules must be balanced just right, neither too difficult nor too easy.

Challenging games are meaningful leaning experiences; games are played to improve a repertoire of skills, even if most exercises are limited to a game context. Still, in the best games, lessons learned from gameplay can be applied to other aspects of life, such as problem-solving, socializing, and spatial skills, even if players do not realize it. One way a video game communicates is through the different rewards or feedback regarding the player's performance. The meaning conveyed by game actions resides in the relationship between these actions and their outcomes, which must be immediately perceivable and integrated into the larger game system as a whole. Over the course of play, all present and future decisions must feel connected to previous decisions.

The integration of formal elements of the game system into the fictional game world may create a meaningful experience that cues the player into understanding rules. Fundamental dramatic elements, such as challenges, are found in all games. If well implemented in the game rules during the design process, more elaborate stories and dramatic techniques, such as premises and well-rounded characters, may also explain the abstract elements of a game system, thus enriching the overall play experiences by creating a deeper sense of involvement for the players.

Vincent Mauger

See also: Dimensionality; Game Engines; Game Feel; Game Writing

Further Reading

Fullerton, T., S. Hoffman, and C. Swain. *Game Design Workshop: Designing, Prototyping, and Playtesting Games*. San Francisco: CMP Books, 2004.

Rolling, A., and D. Morris. *Game Architecture and Design: A New Edition*. Berkeley, CA: New Riders Press, 2004.

Rouse, Richard, III. *Game Design: Theory & Practice*. Plano, TX: Wordware Publishing, 2005.

Salen, Katie, and Eric Zimmermann. *Rules of Play: Game Design Fundamentals*. Cambridge, MA: MIT Press, 2003.

Game Developers Conference (GDC)

The Game Developers Conference (GDC) is an annual professional conference for developers of computer games and video games that is traditionally held in the spring in San Francisco. The conference consists of a combination of discussion panels, tutorials, workshops, lectures, and presentations focused on the development of computer games and video games along with industry awards, an expo, and other events. Participants in the GDC include game designers, programmers, artists, and marketing and other professionals in the game industry. The GDC is a smaller conference than the Electronic Entertainment Expo (E3) and, unlike E3, is geared specifically toward games development rather than the larger game industry.

The conference was founded by game designer Chris Crawford and was first held in 1987 as a meeting of twenty-six developers in San Jose as the Computer Game Designers Symposium before being renamed the Computer Game Developers Conference (CGDC). Ernest Adams functioned as director of the conference from 1991 until 1995; according to Adams, the original meeting of CGDC was inspired by an event called the Artists' Symposium hosted by Trip Hawkins, cofounder of Electronic Arts (EA), for EA employees. In 1995, the CGDC was sold to Miller Freeman, Inc. (later renamed United Business Media Limited [UBM]), and the CGDC was renamed to the GDC in 1999. UBM also publishes *Game Developer Magazine* and operates the website Gamasutra.com.

The GDC hosted the first Game Developers Choice Awards in 2001 (formerly known as the Spotlight Awards [begun in 1997]) in conjunction with the International Game Developers Association (IGDA). The Game Developer Choice Awards are peer-nominated awards that are now awarded annually and include categories for innovation, game design, technology, and lifetime achievement. The Independent Games Festival (IGF) was founded in 1998 as part of the GDC to recognize and highlight independent and student game developers and includes events such as the IGF Awards and the Independent Games Summit (first held in 2007).

As part of the CGDC, in 1994, Adams established the Computer Game Developers Association, now the IGDA, to function as an advocacy organization for game developers. The IGDA operates as an independent entity for purposes of professional development and support for game developers, and it meets and awards scholarships at the GDC. Starting in 2009, UBM initiated several conferences based on the GDC model, including GDC Austin, GDC Canada, GDC China, GDC Europe, and GDC Online, before returning to a single annual GDC meeting based in San Francisco in 2017.

Christopher Hanson

Further Reading

Crawford, Chris. "The First Game Designer's Conference." *Journal of Computer Game Design* 1 (1987). Available at https://erasmatazz.com/library/the-journal-of-computer/jcgd-volume-1/the-first-game-developers.html.

Game Developers Conference website. Accessed September 16, 2020. Available at http://www.gdconf.com.

Hoffman, Erin. "Let's Get Together." *Escapist Magazine*, October 2, 2007. Available at http://www.escapistmagazine.com/articles/view/issues/issue_117/2292-Lets-Get-Together.

Game Engines

There are many forms of game engines available for professional and hobbyist game development and modification, but there are defining characteristics shared by all engines. As a section of the software code that enables the game to run, a game's engine is not directly concerned with particular elements in the game world (what in development are referred to as the game's *assets,* such as sprites, models, textures, and audio) but with allowing and enabling the use of those assets inside the game. An engine, then, may commonly handle issues such as how the image is rendered to the screen (sometimes described as a *graphics engine*, a subset of the game engine), how objects interact with one another (sometimes described as a *physics engine,* a subset of the game engine), communication between computers online or through local area connection (LAN), and how the code relates to various forms of input devices. The game engine is therefore responsible for controlling the behavior on which a game is then built. How dialogue text and audio is stored, recovered, and presented to the player, for example, may well be a matter handled by the game engine, whereas the specifics of plot, story, narrative, or the individual phrases used would not be. How we see what we see on-screen is controlled and determined by the game's engine, but what we see is not, as the differences between games built on the same engine demonstrate.

Professional developers may substantially adapt, rewrite, and add to the code of the game engines they deploy across different games, but the basic underlying engine often remains the same in a fashion more or less invisible to the player. A clear example of the difference in games built on the same engine would be that between Id Software's *Quake* (1996) and Valve's *Half-Life* (1998), in which the look and feel of the two games varies greatly despite their both being first-person shooting games and their shared engine technology. Although built on a modified version of the Quake GoldSrc engine, which added complex physics properties among other changes, *Half-Life* produced a very different play experience that was much praised for its embedded narrative elements and richly imagined world. Valve has subsequently gone on to recognize the significance for both a player community and commercial exploitation of engine development distinct from game development and has released the Source engine, developed for subsequent releases of *Half-Life*, both commercially and for hobbyist modification.

It is crucial to recognize the difference between games and engines, despite the origination of many engines that are developed for a specific game. Some game engines, such as Criterion Software's RenderWare, had no flagship commercial title associated with them and were always seen as what is termed *middleware* in software development (sitting between the finished consumer product and low-level code intended for use by other professional developers), but others, such as the Epic Games' *Unreal Tournament* series (and its Unreal 1 [1998], Unreal 2 [2002], and Unreal 3 [2007] engines) and the *Far Cry* series (and associated CryEngine [2004–10]), have released full commercial games while using their potential for player modification as a key selling point.

Although it might be argued that the production of any game necessitates the inclusion of a game engine, the development of game engines that are not specific to an individual game and are used as part of the code of multiple games has come as a result of the increasing complexity and expense of game development. Being able to transport a substantial section of code across different games has obvious economic benefits for developers in reducing the person-hours required to produce each individual game, for example. Similarly, the economic benefits of building a game on existing code, rather than starting each project from scratch, mean that developers such as Id Software, Crytek, and Epic have been able to capitalize on the development of an engine that may be more profitable when licensed to other developers than in simply selling its stand-alone titles. Distribution of a game's engine with a retail release has also been seen as a key tool for increasing sales, particularly over the medium and long term, with developers benefiting from the distribution of community- and user-created content that increases the available content associated with a game and adds longevity to a purchase at relatively low cost to the developer.

When most players and hobbyists encounter game engines, they are usually accompanied by tools that allow an individual with less technical knowledge to build working games. The Aurora Engine developed by Bioware, which was included with the role-playing game (RPG) *Neverwinter Nights 2* (2006), for example, included all the requirements to build a game with a moderately user-accessible interface and toolset. The initial availability of game engines to player communities had been through the personal computer, with PCs allowing a common interface shared by both developer and consumer and focused on the first-person shooter (FPS) as a genre. However, the popularity of user modification on PCs has since led to the retail release on other platforms of games that are essentially carefully packaged engines with user-friendly interfaces that also include creation tools that aim to lower the barrier to content creation. Examples include *Little Big Planet* (Media Molecule, 2008, developed for the Sony PlayStation 3 and then the PlayStation Portable [2009]) and *Wario Ware D.I.Y.* (2009).

There are also a number of game creation tools (often for games with two-dimensional graphics) distributed freely or sold as software that are effectively game engines in that they include much if not all of the code you would expect to find in an engine. Examples include *RPG Maker* (1992), *Adventure Game Studio* (1997), *RPG Maker 2* (2002), *GameMaker Studio 2* (2017), *Twine* (2009–19), and, for iPhone development, *GameSalad* (2009).

Barry Atkins

See also: Game Design

Further Reading

Busby, Jason, Zak Parrish, and Jeff Wilson. *Mastering Unreal Technology: Introduction to Level Design with Unreal Engine 3*. Cary, NC: Epic, 2010.

Gregory, Jason. *Game Engine Architecture*. Wellesley, MA: A. K. Peters, 2009.

King, Geoff, and Tanya Krzywinska. *Tomb Raiders and Space Invaders: Video Game Forms and Contexts*. London: I. B. Taurus, 2006.

Mäyrä, Frans. "Doom (1993): Controversy, Immersion and Player-Created Mod Culture." In *An Introduction to Game Studies: Games in Culture*, 101–115. London: Sage, 2008.

Game Feel

The term *game feel* is used by video game developers to broadly refer to how a particular video game feels to play. While two video games may be mechanically and generically similar, they may feel radically different to play. For example, both *Super Mario Bros*. (1985) and *Sonic the Hedgehog* (1991) are two-dimensional side-scrolling games in which the player moves a character from left to right while jumping on enemies and trying not to die. Yet, *Sonic the Hedgehog* feels fast and overwhelming, and *Super Mario Bros.* feels heavy and slippery. Despite having similar mechanics, these games feel radically different to play.

The notion of game feel challenges the traditional idea that a video game's mechanics or rule set is the most fundamental part of the video game for the player. It instead suggests that a much wider range of attributes, including visual design, sound, vibration, frame rate, controller design, characters, and themes, contribute to a broader sense of what a video game holistically "feels like" to play. A useful analogy is that of cooking. Two different dishes may use the same ingredients, but the different ways those ingredients are brought together may produce different dishes with different tastes and textures. Game feel is for video games what taste is for food.

Game feel has been used in a variety of ways by different developers and does not always refer to exactly the same thing. In 2005, developers Kyle Gray, Kyle Gabler, Shalin Shodhan, and Matt Kucic wrote a *Gamasutra* article that discusses the "juice" of a video game, which was further popularized by Martin Jonasson and Petri Purho in a game development lecture called "Juice It or Lose It" (see https://www.youtube.com/watch?v=Fy0aCDmgnxg). Across these discussions of "juice" is the recognition that a game's mechanics by themselves are not sufficient for developing a good game but that these mechanics must be "juiced up" with visual and audio effects to feel good to interact with.

Expanding further on this notion is Steve Swink's book *Game Feel* (2009), which draws from the phenomenology of Maurice Merleau-Ponty to formally define just what game feel is. Swink defines three core attributes to game feel: real-time control, simulated space, and polish.

Real-time control refers to "the conversation between human and computer," where the player may make inputs, such as pressing a button or swiping a touchscreen, and see immediate responses that "feel like" they were directly enacted by the player. For instance, when pushing the jump button in *Super Mario Bros.*, the delay before Mario jumps is so minimal that the player feels like he or she has direct, real-time control over Mario's behaviors, and, thus, the player feels to some extent like he or she *is* Mario.

Simulated space does not simply refer to a three-dimensional virtual world but to the simulation of physical interactions within a space, such as the collision of physical objects. If real-time control allows us to control the avatar as if its "body" is our body, then the simulated space is the world that body *embodies*. For instance, when a player walks through the world of *The Elder Scrolls V: Skyrim* (2011), it does not feel like one is simply moving a camera around but that one is moving through a simulated space as a body due to a number of simulated physical interactions: walls are solid, the camera bobs with each footstep, flying is impossible, and monsters may pose threats to your life, depending on where you go. The player feels like he or she has a body *within* this space.

Polish refers to "any effect that artificially enhances interaction without changing the underlying simulation" and is similar to the developers' discussions of "juice." For instance, the sound effect played when Mario jumps and the dust particles and footprints that appear when the player moves in *Journey* (2012) do not fundamentally impact the core systems of those games; however, they are crucial to those games for players to feel like bodies within spaces. If one were to remove the polish from a game, the game itself would arguably remain the same; however, what it feels like to *play* that game would be radically different for the player.

There are limitations to Swink's conceptualization of game feel. Most crucially, it is prescriptive, with Swink claiming that any game that does not possess all three attributes (real-time control, simulated space, and polish) does not possess game feel. This is less useful than considering how any particular video game feels to play. For instance, a turn-based game such as *Final Fantasy: Tactics* (1997) does not provide real-time control in Swink's sense; however, it *does* provide real-time control through moving the cursor and navigating menus, and using these interfaces still feels a certain way. Likewise, a text-only interactive fiction game may not simulate a space, but the physical space of the computer monitor and the particular colors and fonts chosen still ensure that the game will feel a certain way to play. These limitations aside, Swink still provides a valuable starting point for considering and conceptualizing game feel as a foundational aspect of the experience of playing and interpreting video games.

Ultimately, game feel refers to the sum of all parts of the experience of playing a video game, where the mechanics are not easily separated from the narrative or the physical platform. Instead, game feel provides a means for the developer, critic, and scholar to consider what the holistic experience of playing a particular video game is for the player and, thus, what the overall embodied experience offered by that game truly is.

Brendan Keogh

See also: Game Design

Further Reading

Keogh, Brendan. "An Incomplete Game Feel Reader." *Brendan Keogh* (blog), March 31, 2017. Available at https://brkeogh.com/2017/03/31/an-incomplete-game-feel-reader/.

Keogh, Brendan. *A Play of Bodies: How We Perceive Videogames*. Cambridge, MA: MIT Press, 2018.

Swink, Steve. *Game Feel: A Game Designer's Guide to Virtual Sensation*. Burlington, MA: Morgan Kaufmann Publishers, 2009.

Game Genealogies

A game genealogy traces the design and idea for a video game back through a series of precursors and innovations that reveal the conceptual history behind the game's final incarnation. Such connections can trace the rise and expansion of game designs and genres as a series of variations and additions, each building on what came before it, acknowledging the influence of a game's many predecessors.

For example, one can trace the roots of Namco's *Galaga '88* (1987) back to Ralph Baer's early home video game prototypes. Baer's 1968 "Brown Box" video game system prototype featured a ping-pong game, or "TV Tennis" game, which would eventually be released on the Magnavox Odyssey, the first home game system. On May 24, 1972, the Magnavox Odyssey was on display at the Airport Marina in Burlingame, California, where it was seen and played by entrepreneur Nolan Bushnell, the founder of Atari. The Odyssey's tennis game inspired the arcade game *PONG* (1972), which Atari released a few months later. Bushnell and his employee Steve Bristow wanted to create a single-player version of *PONG*. By replacing one side of the screen with a grid of bricks and rotating the screen a quarter turn, they came up with the design for *Breakout* (1976), which Atari then produced. *Breakout* went on to inspire Japanese game designer Tomohiro Nishikado to create a similar game with a space theme (a science fiction touch influenced by the film *Star Wars* [1977]) in which the grid of bricks was replaced with a grid of aliens (the design of which was influenced by tentacled aliens of *The War of The Worlds* [1953], a film adaptation of H. G. Wells's book) and allowed the player character and the aliens to shoot at each other. Nishikado's game, *Space Invaders* (1978), inspired the design of Namco's *Galaxian* (1979), designed by Kazunori Sawano, who added a wraparound screen (which first appeared in *Spacewar!* [1962]), colored sprites, and enemies that would occasionally charge down at the player character (*Tempest* [1981] was also inspired by *Space Invaders*). *Galaxian*'s success led to a sequel, Namco's *Galaga* (1981), which added such features as enemy tractor beams, a capturable ship, the ability to shoot more than one projectile at a time, and a recurring "Challenging Stage." *Galaga* itself inspired a sequel, *Galaga '88* (1987), which included even more new features, such as enemies that begin as eggs, canisters that are collected to allow the player character to move to new dimensions, a double ship that can be captured, and background images from the game *Bosconian* (1981). Thus, *Galaga '88* (which itself was redesigned and rereleased in the *Galaga 30th Anniversary Collection* (2011) for iOS) can be seen as the descendent of several video games, its genealogy reaching back two decades and into works from other media as well.

Mark J. P. Wolf

Further Reading

Baer, Ralph H. *Videogames: In the Beginning*. Springfield, NJ: Rolenta Press, 2005.

Osborne, Scott. "Galaxian and Galaga." *GameSpy.com*, June 1, 2001. Available at http://www.gamespy.com/articles/493/493431p1.html.

Preston, Cathy. "Classic GI: Space Invaders." *Game Informer* 177 (January 2008): 108–109.

Retro Gamer Staff. "Nishikado-San Speaks." *Retro Gamer* no. 3 (n.d.) (Live Publishing): 35.

Game Guides

A video game strategy guide is a printed or digital manual with instructions on how to navigate the play of a specific video game. The content of a strategy guide is more detailed than a game manual and is usually broken into several chapters that each deal with a different aspect of gameplay.

Some of the common sections found within a guide are chapters that explain game mechanics, such as controllers and menus; walkthroughs that show what the player must do in sequence to complete the video game; details on items that can be found and equipment that can be used; information about computer-controlled opponents and characters; equipment used by players and their opponents; and appendices for important statistics, gameplay goals (such as achievements or trophies), and inventories of game items. The organization or inclusion of the sections is not standardized. Other information may be included, and some of the sections just described may be excluded. Guide content can vary greatly depending on the type of game being covered and the quality of the information presented.

The term *strategy guide* is most accurately applied to documents that include more than one section of information on a video game. A document with just a walkthrough or dealing with only enemy statistics and tactics is usually not considered a complete "guide."

Two companies, Prima Games and Brady Games, currently dominate the market for printed stand-alone strategy guides. Magazines and websites, such as GamePro and IGN.com, offer guides for many games as well. Prima Games is credited with publishing the first stand-alone strategy guides in book form in 1990, a series of *Game Secrets* books that compiled information for the Super Nintendo Entertainment System (SNES), NEC PC-Engine/TurboGrafx-16, Nintendo Game Boy, and SEGA Genesis. Magazines had previously published similar information, but Prima was the first company to compile and sell guides as books. Several companies followed suit, peaking in the mid-1990s with a crowded marketplace that included imprints such as Brady Games, Versus Books, Nintendo Power, and DoubleJump.

In the early years of strategy guide publishing, the guide companies, if they could not secure an official license, released unauthorized guides. These were hastily created postrelease using retail versions of the games, and they avoided using screenshots from the actual game or official art. This practice was frowned on by video game developers and challenged when Nintendo took legal action against Prima Games in 1997 over an unauthorized guide for *GoldenEye 007* (1997) for the Nintendo 64 system. The case, settled out of court, actually opened up the relationship between developers and the top strategy guide publishers.

The practice now is for developers to treat game guides like other licensed products based on their intellectual property (IP). Guide publishers pay a fee to license the right to create a book based on a video game. In return for this fee, the publishers are granted early access to game code as well as official game art and other support, such as documentation.

As unauthorized guides became less common, the pendulum swung the other way, and multiple official game guides would be published for a single video game title. Developers would license the rights to several guide publishers, who would create competing guides. Consumers could find as many as four game guides for a single video game title. For example, Prima Games, Brady Games, Versus Books, and Nintendo Power all published game guides for *Super Mario Sunshine* (2002) for the Nintendo GameCube.

The game guide industry contracted when Versus Books folded in 2003 and Nintendo Power decided to focus on magazine publication instead of stand-alone guides. This left Brady Games and Prima Games with a few smaller publishers that generally covered niche games.

The licensing deals between the two major publishers and video game developers have shifted to long-term exclusive contracts. For example, Prima Games has been the exclusive publisher of Nintendo first-party game guides, whereas Brady Games has an ongoing relationship with Blizzard Entertainment.

The two publishers have lost exclusivity as well over the years. The license to create Capcom game guides, for instance, has switched hands a few times over the years, residing with Brady Games as of early 2011. Some video game publishers continue to offer licenses on a game-by-game basis. It can also be the case that a game developer retains the rights to license a game guide even though its publisher has an exclusive deal with one of the guide publishers.

When a license is granted, the book publisher is then responsible for the writing, design, and layout of the game guide. The game developer is contractually obligated to give support, but this can vary from title to title. At the very least, the game guide publisher gets a beta version of the video game to work from.

A writer, or team of writers, will begin to play the game and create the text of the guide. A graphic design team, usually working with art supplied by the developer, will create the page design and lay out the text once it is finished and edited. Screenshots will be taken from the game, and maps, either created by the game publisher or supplied by the developer, will be labeled and polished for inclusion in the guide.

The finished product will be reviewed by the video game developer (often by the testing group involved with the project), which will check for accuracy and brand alignment (correct terminology, tone, etc.). Due to the schedules for printing the game guides, final files for the book must be at the printer several weeks before the release of the game. It can therefore be the case that the guide writers are not working from a final copy of the game. The developer review is to ensure the book is as accurate as possible to the retail game.

In recent years, the focus of guides has begun to shift toward offering more exclusive content that may not be directly related to the playing of the video game. Examples include developer interviews, production art reproductions, developer studio tours, and other behind-the-scenes material. Plus, a greater number of hardcover collectors' edition game guides have appeared in recent years in response to the availability of strategy and walkthrough information online. Guide publishers have leveraged their relationships with game developers to obtain material that cannot be mined from the games themselves, thereby creating unique physical artifacts of the game experience. Game publishers also offer electronic versions of their guides as well as pay-to-access websites.

Mario De Govia

See also: Game Manuals

Further Reading

Bergstrom, Kelly. "EVE Online Newbie Guides: Helpful Information or Gatekeeping Mechanisms at Work?" *AoIR Selected Papers of Internet Research* 3 (2018). Available at https://journals.uic.edu/ojs/index.php/spir/article/view/8584.

Egliston, Ben. "Building Skill in Videogames: A Play of Bodies, Controllers and Game-Guides." *M/C Journal: A Journal of Media and Culture* 20, no. 2 (2017). Available at http://www.journal.media-culture.org.au/index.php/mcjournal/article/view/1218.

Game Informer

Game Informer magazine is a monthly print and digital publication dedicated to video game journalism that is headquartered in Minneapolis, Minnesota. The magazine publishes a wide variety of video game news, reviews, and previews of upcoming games. The digital publication is known as *Game Informer Digital*. Additionally, the magazine also maintains GameInformer.com, the complementary website to the print and digital publications. The website features videos, podcasts, and more up-to-date video game news.

The publication began in 1991 under the guidance of Elizabeth Olson, the first editor in chief, and Andy McNamara, a part-time FuncoLand (now known as GameStop) store employee who became Olson's editorial assistant. The decision to form the magazine came when the owner of the FuncoLand stores, David R. Pomije, decided that advertising dollars would be better spent on his own publication. Located in New Hope, Minnesota, FuncoLand's headquarters was the birthplace of *Game Informer* magazine, which started as a small quarterly magazine, eventually appeared bimonthly, and then became a monthly publication. It was also one of the first magazines using computer-designed pages for its layouts. In 1993, McNamara and Olson became coeditors in chief, with McNamara taking over the position individually later that year with issue sixteen.

Game Informer grew steadily over the next decade, and in 1996, the publication's website was established as *Game Informer Online*. In 2000, Funco, Inc., the parent company of FuncoLand and *Game Informer*, was purchased by GameStop Corp., which was itself formed out of Barnes & Nobles's acquisition of several entertainment companies, which included Funco, Inc.; Babbages; and Software Etc. Under new ownership, the magazine underwent a redesign and featured a larger format, averaging over one hundred pages per issue. The website also went under a redesign and was rereleased in 2003.

In 2001, Cathy Preston became *Game Informer*'s publisher and played an integral role in incorporating the magazine into GameStop's loyalty program, PowerUp Rewards. Pro and Elite Pro loyalty members receive twelve issues of *Game Informer* with their paid membership. With the partnership between the retail store and the magazine, subscriptions began to grow exponentially.

In 2009, *Game Informer* released an updated version of the website with even more exclusive content for print and digital subscribers as well as the release of its own podcast, *The Game Informer Show*. Additionally, *Game Informer Australia* was also released in 2009 and has become Australia's leading gaming publication. *Game Informer* is now the leading game journalism magazine in the world and has a verified circulation of 7,585,296 (as of December 2017), according to the Alliance for Audited Media, with subscribers making up 5.3 million of the total circulation. The publication has released over three hundred issues since its creation, and according to *Game Informer*'s website, one out of every forty people in the United States subscribes to the magazine. As of early 2019, Cathy Preston still remains *Game Informer*'s publisher, with Andy McNamara as editor in chief and Andrew Reiner as executive editor.

Ashley P. Jones

Further Reading

Game Informer magazine website. Accessed September 16, 2020. Available at https://www.gameinformer.com/.

Game Manuals

A game manual is typically a printed booklet of fewer than fifty pages that is packaged with the software. The manual explains the basic operations a player will need to know to begin playing the video game and covers such topics as game installation, controller maps, saving and loading, basic movement, legal text and warnings, and other options available. Some manuals also include a brief précis of the game's storyline and characters or other game world content to help orient a player in the game's environment. Unlike a game guide, a game manual does not provide detailed instructions for how to complete the video game.

The history of the game manual goes back to board games, and game manuals accompanied early video game hardware, such as the Magnavox Odyssey (1972), which came with a thirty-six-page manual that included detailed connection and game instructions. With overlays for the TV and physical game pieces (including play money and "frosted tape"), the Odyssey games were somewhat involved undertakings. The Atari *Home PONG* system (1975), with its very limited game choices, only gave directions to attach the system to the customer's television, with a few paragraphs dedicated to the mechanics of playing the game itself.

With the appearance of the Atari VCS 2600 in 1977 and the resultant boom in video game development, game manuals showed the controls and unique gameplay elements of their products. Graphics were rudimentary, but to differentiate their colored digital block graphics from those of other companies, developers would create hooks, such as exciting titles and short backstories, for their games. These stories were typically rudimentary, needing no more than a few paragraphs to give a narrative context to the action on-screen. The manual for *Adventure* (1979) for the Atari 2600, with its sword-and-sorcery game world of thirty-one screens, has four paragraphs of story, and yet *Super Breakout* (1978) for the Atari 2600 also has four paragraphs of narrative context, despite its simple and abstract gameplay. Other manuals of the time, such as the one for *Pitfall!* (1982), gave more information regarding character motivation, but not much.

Similarly, the simple controls of the Atari 2600 usually did not warrant very many instructions for playing the games. There were a few exceptions; *Stellar Track* (1981), which also had only four paragraphs of narrative context, had seventeen chapters of explanations of how to play the game, and Activision's *Space Shuttle* (1983) had a thirty-two-page game manual and special overlays for the console itself. Players had to use almost every switch on the 2600 console to control their shuttle flight, which required a more detailed booklet of instruction.

The Mattel Intellivision (1980), ColecoVision (1982), and Atari 5200 (1982) consoles introduced more complex controllers, with keypads and more than one button to complement the joystick. With the added complexity of the controls, more involved instructions were necessary, resulting in larger game manuals overall. Often, the video games would still only have the barest hint of a plotline.

The launch of the Nintendo Entertainment System (NES) also heralded a change in video game manuals. The booklets continued to give controller instruction, but with a more complex game world possible, the world-building information could also be expanded. The most extreme and popular example of this was the game manual for *The Legend of Zelda* (1986); the first ten pages include a full introduction to the game world and a hint-filled summary of the game story, complete with illustrations. The forty-eight-page manual includes almost all the same types of information as a modern strategy guide, with the exception of a full walkthrough.

During the late 1980s, game guides were not available, so several video game manuals followed the example of *The Legend of Zelda*. Most noteworthy was the release of *Phantasy Star II* for the SEGA Genesis in 1990. The video game box included a standard instruction manual but also came with a 113-page hint book and a map poster.

Home computer games during this time were more likely to be packaged with robust instruction manuals, as the game types were often more complex than those that could be developed for home consoles. However, as game guides (also known as strategy guides) became popular and the internet became more accessible, game manuals have tended to constrain themselves to basic functions.

Even with the more involved narratives possible in modern games, game world information is often no more than a page in the game manual because a story can be told completely during the play of a game through dialogue, action, and cinematic cutscenes. For example, *Fallout 3* (2008) is a role-playing game (RPG) with more than one hundred hours of gameplay and a massive storyline; yet, the manual only allots one page out of forty-five to backstory, although the game manual's text and design hints at the atmosphere of the game's postapocalyptic world. *Mass Effect 2* (2010), another RPG with a sprawling story and multiple characters, has only a four-sentence paragraph of backstory in its manual. In games with highly interactive gameplay that reveals story, characterization, and the history of their environments, discovery of these narrative elements is key to the entertainment value of these games, so they are not revealed in the manuals.

Perhaps the most involved game manuals in the modern era of video games are those for massively multiplayer online role-playing games (MMORPGs). The *World of Warcraft* (2004) game manual is 114 pages long and incorporates highly detailed instructions on how to use the game's systems as well as over 40 pages of game world information. Even with such a large game manual, the complex systems involved in playing *World of Warcraft* have warranted several stand-alone full-sized game guides and uncountable numbers of online guides.

Game manuals will continue to evolve along with the games they represent, either by going fully online along with the games they accompany or by being completely integrated in game playthrough tutorials.

Mario De Govia

See also: Game Design; Walkthroughs

Further Reading

Atari. "*PONG* for Your Home TV: Owner's Manual." Accessed September 16, 2020. Available at http://www.flickr.com/photos/umpqua/sets/1312509/.

AtariAge. "Atari 2600 Manuals." Accessed September 16, 2020. Available at https://www.atariage.com/system_items.php?SystemID=2600&itemTypeID=MANUAL.

Blizzard Entertainment. *World of Warcraft* manual. Available at https://bnetcmsus-a.akamaihd.net/cms/template_resource/LO0VQ46XB1281555957773363.pdf.

Colecovision Zone. "Original Release 1982–1984." Accessed September 16, 2020. Available at http://colecovisionzone.com/page/game/game.html.

Id Software. *DOOM* README.TXT file for *DOOM* v1.8. Accessed September 16, 2020. Available at http://www.classicdoom.com/doominfo.htm.

"*The Legend of Zelda*: Instruction Booklet." NES Files. Accessed September 16, 2020. Available at http://www.nesfiles.com/NES/Zelda/Zelda.pdf.

Magnavox Odyssey user manual. Available at https://www.videogameconsolelibrary.com/images/Manuals/72_Magnavox_Odyssey-Manual.pdf.

"*Phantasy Star II* Hint Book." Accessed September 16, 2020. Available at http://www.pso-world.com/gallery/showgallery.php?cat=720&page=1.

Game Modifications

Game modifications, or "mods," are the ways in which players alter the artwork and other content of video games. Understood broadly, they also cover hardware and interface modifications. A "modder," then, is a person who creates mods. Such modifying requires a degree of technical skill and may focus on the sound, graphics, maps, mechanics, narrative, game modes, or physics of the game. From the player's perspective, a mod can, for example, offer new items or characters to play with.

Modifications fall into wider categories of custom content, user-generated content, and player co-creativity. Mods are sometimes called *add-ons,* which is a general term used when referring to optional extensions of software. Furthermore, specific kinds of mods have their own names. Alterations of character and item graphics are known as *skins*. *Skinning* is thus about creating the images, or textures, that a game program wraps around three-dimensional character models, also known as *meshes,* in the process of three-dimensional rendering.

Those mods that stand alone as new games altogether are called *total conversions*. The most famous mods are those that have also been known as independent games and may be released as retail products. First-person shooting games have been an especially good breeding ground in this regard. *Counter-Strike* (1999) is one of the most famous mods and an extremely popular total conversion. It was created as a *Half-Life* modification by Minh "Gooseman" Le and Jess "Cliffe" Cliffe in 1999 and later expanded into a series of games. *Half-Life* (1998) itself was originally a mod of *Quake II* (1997), but unlike *Counter-Strike,* it was created as a commercial product by two former Microsoft programmers, Mike Harrington and Gabe Newell. They founded Valve Software and built *Half-Life* using the *Quake* (1996) game engine (Kücklich 2005).

Valve has had an impact on *Counter-Strike*'s distribution as well. After *Counter-Strike* was published within a player community, Valve soon teamed up with its developers, and a retail version of the original mod was published in 2000. According to the sales figures of now defunct SteamSpy, *Counter-Strike* had sold eleven million copies by 2015 despite its availability as a free download for years. In 2003, Valve also released Steam, an online games distribution, communication, and multiplayer platform that grew into a major digital distribution channel for independent games and a general hub for content delivery, management, networking, and streaming. Later on, in 2012, Steam introduced Steam Workshop to foster the sharing of mods for games available on Steam.

Varying from independent skins to total conversions, content modifications differ in the degree to which they change the original game. Instead of adding new content, some mods unlock material that already exists in the original. A mod unlocking the "Hot Coffee" minigame in *Grand Theft Auto: San Andreas* (2004) is such an example. "Hot Coffee" is also an example of how mods may affect the rating of the original game; because it represents sexual intercourse between the game's characters, the mod's release triggered reconsiderations regarding the age rating of the original game (see Rockstar Games). In contemporary gamer culture, specific mods have turned into global memes. Such was the case of Bowsette (created in 2018), an imaginary gender-bent version of Mario games' Bowser, who found thousands of modded articulations in numerous Mario games just within a couple of months.

Mods are often offered as free downloads online on hundreds of modding websites. These websites' forums, especially those maintained by game publishers, often concentrate on a specific game, but large all-encompassing modding databases also exist. Mod DB, created by Scott "INtense!" Reismanis in 2002, is the largest general modding website. The website gathers together thousands of mods for numerous platforms and games as well as tutorials, videos, news, and information on games, and it is now owned by a private company, DesuraNET Pty Ltd. Some such mods have paved the way for the emergence of specific game genres as well. Most famously, battle royale games—featuring titles such as *PlayerUnknown's Battlegrounds* (2017) and *Fortnite* (2017)—evolved from multiplayer mods in open-world survival games.

Content modifications can be controversial because of possible copyright infringements. The games industry has approached modding in various ways, with some people attacking the modding communities and others openly supporting such creativity and sharing. Many companies encourage modding with free modifying tools, and a number of games in the late 2000s, such as *Little Big Planet* (2008) and *Spore* (2008), were actually created with the expectation that players would significantly contribute to content creation. *The Sims* (2000), with its mod-inspired expansions and two sequels, has developed into a modder-friendly game and inspired the sequels *The Sims 3* (2009) and *The Sims 4* (2014), which integrate the creation of skins into the actual game product, resulting in the blurring of the line between gameplay and modding.

Profits and other kinds of benefits gained from modding are complicated because they involve questions of copyrights on one hand and potential exploitation of free labor on the other. For example, the economic importance of players' creativity has been openly acknowledged by *The Sims*' series creator, Will Wright. Content mods aid the industry by extending the lifetime of games because they are being elaborated with new objects, levels, or quests, offering the industry the benefits of free labor. According to *PC Gamer*, however, some character scripters and creators of translation patches or custom maps and units have gained healthy income from selling their mods. Modifying is also a source of innovation and inspiration for the industry (Sotamaa 2007). Although those who create mods rarely see profits from them, mod-making is a useful form of training for future game developers because it often involves similar teamwork as commercial game development; for example, the development team Home Front's mod for *Battlefield 1942* (2002) was composed of twenty-seven members (Postigo 2007).

User interface (UI) mods are yet another type of mod. Typically, a UI mod allows a more efficient way to perform certain commands. The majority of these mods are for massively multiplayer online role-playing games (MMORPGs) and add functions that were not originally implemented in their interfaces. For example, an interface mod may allow the player to use the game's map in a new way or offer shortcuts to specific items, such as weaponry.

Hardware modifications require knowledge of the game hardware and include installing modification chips ("modchips") into game systems. Hardware modding usually involves game consoles and is done to enable the use of unlicensed and sometimes illegal software, such as copied games and third-party software, including homebrew games. The main function of a modchip is to replace or override a game system's protection hardware or software against the use of such media. Because the spread of modchips has affected the sales of legally manufactured and distributed games, the games industry has taken measures to reduce their use. For instance, Microsoft has banned modded Xbox 360s from using online gaming services, and the installing of certain modchips has been made more complicated.

Different national legal systems have addressed console modding inconsistently over time. Console modding for one's own use is treated differently from commercial enterprises that build on mods. For instance, the first criminal trial over console modding in the United States took place in 2010. Nintendo claimed a victory in Canadian court over 3DS mod chip and flash cart sellers in 2017. In Japan, the modding of game save data and game consoles was made illegal in early 2019.

Finally, game modifications created as independent art pieces are often aimed at audiences other than the players of the original games and presented at art galleries and other such venues. One of the earliest artistic works is Julian Oliver's *The Quilted Thought Organ*, or *QTHOTH*, which ran from 1999 through 2001 and explored the possibilities of performing experimental music with FPS game engines. *Velvet-Strike* (2002), by Anne-Marie Schleiner, is an antiwar in-game graffiti collection for *Counter-Strike*. Dan Pinchbeck's *Dear Esther* mod of *Half-Life 2* (2004) is an interactive narrative that has been acknowledged for its storytelling and world and was selected for exhibition at the 2008 Ars Electronica animation exhibition. Another work, *PainStation* (2001), by Volker Morawe and Tilman Reiff, turns a *PONG* (1972) arcade game into a two-player game in which a failure to return the ball to the opponent is "punished" with a real physical electroshock. *PainStation* has been widely exhibited around the world—at the Museum of Contemporary Art Taipei and the Museum of Modern Art in New York, among other museums. Such examples demonstrate the multitude of mods being created by players and artists, who approach video games from a variety of angles.

Hanna E. Wirman

See also: Co-Creativity; Game Design

Further Reading

Kücklich, Julian. "Precarious Playbour: Modders and the Digital Games Industry." *Fibreculture* 5 (2005). Available at http://journal.fibreculture.org/issue5/kucklich.html.

Postigo, H. "Of Mods and Modders: Chasing Down the Value of Fan-Based Digital Game Modifications." *Games and Culture* 2, no. 4 (2007): 300–313.

Sotamaa, O. "On Modder Labour, Commodification of Play, and Mod Competitions." *First Monday* 12, no. 9 (September 2007). Available at https://firstmonday.org/article/view/2006/1881.

Game Studies

Game Studies, founded by Susana Tosca and Espen Aarseth in 2001 and available at gamestudies.org, is an international double-blind peer-review research journal dedicated to the eponymous field, with editorial and review board members from Europe and the English-speaking world and a rejection rate of 75–90 percent. Aarseth has been editor in chief since the first issue. The journal has an online readership of about thirty thousand to fifty thousand readers per month and has been open access from the start, with a goal of reaching not only academics but also practitioners and the general public. Other main goals were to publish excellent game research, to provide feedback to researchers in the field, and to make the field of game studies visible and more established through its first scholarly journal. Another reason for choosing open access rather than a subscription model was to avoid having to publish lower-quality articles to meet a commercial publisher's volume targets. Over the years, it has received funding from Norwegian, Swedish, and Nordic public research foundations.

The first issue, published in July 2001, is known for both announcing the birth of the field, "Game Studies, Year One," and for kicking off the fairly heated controversy of whether games are a kind of narrative, with articles by editorial board members Jesper Juul and Markku Eskelinen, among others. Because of this, the journal has been associated with the position of *ludology* (the need for game-oriented theories on games) (Aarseth 2014), despite the fact that most of the editorial board members from that time were actively applying narrative theories to games in their own research (including Juul and Eskelinen) and that the journal's editorial position on the question has been neutral.

The journal was originally based in Bergen, Norway, and moved with Aarseth to Copenhagen with the establishment of the Center for Computer Games Research at the IT University of Copenhagen in 2003. Within the field of game studies, it has mostly published humanities-based research, with some social sciences, psychology, and design focus, but mostly qualitative rather than quantitative research. The goal has been to publish two to three issues a year, and because of Nordic public funding requirements, this is currently set to three issues.

Most of the articles have been standard peer-reviewed research articles, with an intermittent section of book reviews and occasional editorials. A number of special issues have been published on topics ranging from the pioneering massively multiplayer online game (MMOG) *EverQuest* (1999), via game design and games and war, to queer game studies. In the early years, the journal also featured a series of interviews with game designers written by Celia Pearce.

While the stated focus of "the international journal of computer games research" has been on digital games, in an editorial in 2017 (Aarseth 2017), Aarseth recognized and explicitly welcomed the journal's de facto interest in all kinds of games and play phenomena, not only computer games.

Espen Aarseth

Further Reading

Aarseth, Espen. "Just Games." *Game Studies* 17, no. 1 (2017).

Aarseth, Espen. "Ludology." In *The Routledge Companion to Video Game Studies*, 211–215. New York: Routledge, 2014.

Game Studies website. Accessed September 16, 2020. Available at http://www.gamestudies.org.

Game Transfer Phenomena

After playing an intense game for several hours, players sometimes have elements or experiences of the game transfer over into the physical world; these occurrences are known as *game transfer phenomena* (GTP), and informally as the "Tetris effect." These experiences are similar to having a catchy tune stuck in your head or the unwanted intrusions of past events into one present-day waking life, as found in patients with post-traumatic stress disorder (PTSD). GTP experiences may include altered perceptions in which game elements or behaviors are overlaid on the real world, involuntary thoughts or behaviors that pertain to the game, pseudohallucinatory experiences, auditory or tactile sensations, and automatic motor activations. In extreme cases, the player may actually be confused as to whether or not he or she is still in the game.

The term *game transfer phenomena* was coined by Angelica B. Ortiz de Gortari in 2010 for her study of forty-two Swedish gamers. Since then, studies of over six thousand gamers and their experiences have been conducted. According to Ortiz de Gortari and Griffiths (2015), "having a pre-existing medical condition, playing for 3–6 h[ours], and playing for immersion, exploration, customization, mechanics and escape from the real world were significantly associated with having experienced GTP." According to Ortiz de Gortari (2016), characteristics of GTP may include the following:

> - Most GTP occur in full awake state while engaging in everyday tasks, but GTP can also manifest under hypnagogic states—borderline states between awake and sleep or while waking up.
> - In many cases GTP occur triggered by associations with game-related stimuli (e.g., objects/events simulated in the game).
> - GTP usually last for seconds or minutes, but there are reports of experiences for days, weeks or longer.
> - Reality testing remains intact, meaning that gamers know that the manifestations are not real. However, sometimes the vividness of the sensory intrusions (e.g., hearing sounds as coming from nowhere or seeing images overlaying objects) and game-related objects that evoke emotions has resulted in impulsive responses (e.g., involuntary actions). These appear to happen during episodic moments of dissociation where gamers feel as being in the game or believe for moments that the game elements are real. (Ortiz de Gortari [2016])

While GTP can occur in a variety of experiences, more extreme cases of GTP can be damaging to a player's mental health and physical health and can disrupt his or her relationships, education, and daily life in general. Players may even attempt dangerous behaviors in real life that they are used to performing in games, such as driving recklessly or attempting physical stunts. The study of GTP is still in its early stages, but the treatment for it seems to be spending time away from games, limiting the time playing them, and participating in more real-world activities.

Mark J. P. Wolf

Further Reading

Goldsmith, Jeffrey. “This Is Your Brain on Tetris.” *WIRED*, May 1, 1994. Available at https://www.wired.com/1994/05/tetris-2/.

Kardaras, Nicholas. *Glow Kids: How Screen Addiction Is Hijacking Our Kids—And How to Break the Trance*. New York: St. Martin’s Press, MacMillan Publishers, 2016.

Ortiz de Gortari, Angelica B. “Game Transfer Phenomena: Targeting the Real Life Impact of Virtual Interactions.” 2016. Available at https://www.academia.edu/466655/Game_Transfer_Phenomena_in_Video_Game_Playing_A_Qualitative_Interview_Study_Intern

Ortiz de Gortari, Angelica B. “Game Transfer Phenomena in Video Game Playing: A Qualitative Interview Study.” *International Journal of Cyber Behavior, Psychology and Learning* 1, no. 3 (July–September 2011): 15–33. Available at http://hypermedia468.pbworks.com/w/file/fetch/81299258/43105-IJCBPL%20GTP%20VG%202011.pdf.

Ortiz de Gortari, Angelica B., and Mark D. Griffiths. “Game Transfer Phenomena and Its Associated Factors: An Exploratory Empirical Online Survey Study.” *Computers in Human Behavior* 51, Part A (October 2015): 195–202. Available at https://www.sciencedirect.com/science/article/pii/S0747563215003568.

Game World. *See* World (of a Video Game)

Game Writing

The textual content of video games and the narrative situations they produce (as abstract or minimal as they may be) are shaped in many ways. Depending on the type of narrative and the game genre, approaches to game writing differ greatly from each another, from the casual platform game to massively multiplayer online role-playing games (MMORPGs) written to be never-ending and played for years; furthermore, the methods through which story materials are communicated to audiences are diverse and intertwined within a complex game development process. This multifaceted aspect of narrative in games, combined with their interactive context, adds to the inherent complexity of the game writing practice.

The writing of video game narratives differs significantly from the writing of narratives in traditional media such as film or television. Whereas narrative practices are codified and consensually agreed upon in some artistic disciplines, the evolutionary flux characterizing video game narrative conventions, correlated to rapidly changing technological innovations, could take decades to stabilize. This explains the relative lack of solid models for great game narratives.

Video game writing has much in common with screenwriting and fiction writing (such as characters, viewpoints, dialogue, and dramatic situations), yet some codes, expectations, and limitations are unique to the medium of video games and relate to technical writing (e.g., coding). Screenplays, novels, and short stories mostly present paths fixed in their material; all their textual mechanisms are left in the readers’ hands and minds. In contrast, video games are all about dynamic adaptation and reactions to players’ choices and performances.

Tabletop role-playing games (RPGs) also involve player choices, but they are written to be open experiences that are usually directed by game masters, who may ad-lib on the fly if players outrun them. Such improvisation is impossible in video games. Narrative elements must be defined in advance to be communicated or their potential to support players' narrative elaborations must be present in the game structure beforehand.

To write for video games, then, one must conceive of a closed system scripted in such a way so as to keep players satisfied within the confines of a limited set of actions that the game writer must anticipate in advance. This can be a considerable task in larger and more complex games. A video game script, then, must also be sufficiently adaptable, accounting for the actions that a player is likely to try during gameplay and, at the same time, constrained enough to fit within the specific technological limitations of software and hardware.

Although game writers may guide the way games convey narrative information and integrate action sequences and cutscenes, their main task is the codifying of narrative information. They write dialogue and script events and compose any other texts that are needed. Interactive script formats are varied and may be a mix of general script, programmer script, voice actor script, and translator script, all of it augmented by artist and animator references. Game writing is not the same discipline as game design, although this is a frequently held misconception resulting from the close connection between a game's narrative and the maintenance of a consistent vision behind the game. An answer to this need accompanying the increasing complexity of video game projects is the establishment of dedicated *narrative designers* in the industry since 2004.

Yet, game writers do not create video games; they produce assets needed for them, and their connection to gameplay means that they must immerse themselves in game design documents. Game writers are a part of the whole game development team. They may write in groups or on specific pieces of vast narratives, and they also may be contracted as freelancers.

Vincent Mauger

See also: Game Design; Game Feel

Further Reading

Bateman, Chris, ed. *Game Writing: Narrative Skills for Videogames*. Boston, MA: Charles River Media, 2006.

Despain, Wendy, ed. *Professional Techniques for Videogame Writing*. Wellesley, MA: A. K. Peters Ltd., 2008.

Despain, Wendy, ed. *Writing for Video Games Genres: From FPS to RPG*. Wellesley, MA: A. K. Peters Ltd., 2009.

Gamergate

Gamergate is a coordinated campaign of hate, abuse, and harassment waged anonymously online (largely through Twitter, 4chan, and Reddit) that has targeted women, sexual and racial minorities, and the men who support them. The perpetrators of this abuse ("Gamergaters") have resorted to doxing, hacking into private accounts, spreading personal information and sensitive photographs online, and issuing anonymous but credible death and rape threats that sometimes include the names of the victims' family members and home addresses.

The campaign inspired, popularized, and became associated with the Twitter hashtag #GamerGate. Though the behaviors of the misogynists and harassers using the #GamerGate tag often seem criminal, law enforcement has been slow to comprehend the seriousness of online threats and harassment. The FBI has acknowledged investigating potential criminal behavior, but no arrests have been made in connection with Gamergate to this date.

One of the central targets of harassment was independent game designer Zoë Quinn, whose game *Depression Quest* (2013) became the subject of scorn for conservative online gamer groups. Although Quinn had tangled with such groups in the past, the event often identified with setting Gamergate in motion was a vengeful, intimately detailed WordPress blog (*The Zoe Post*) about Quinn, which was created in August 2014 by her disgruntled ex-boyfriend Eron Gjoni. The blog doxed Quinn and revealed highly personal details about their relationship.

Gjoni admits the blog was intended to make Quinn the target of an aggressive, misogynist online community. In one post ("TL;DR"), Gjoni lists twenty-four reasons for his grudge against Quinn, including the accusation that Quinn had cheated on him with a games journalist. At Gjoni's prompting, 4chan users promoted the blog to a wider internet audience, which responded with posts and images that often paired a narrative about lapsing journalistic ethics with abusive and vulgar content directed at Quinn and others.

Apparently, and allegedly, #GamerGate was a grassroots movement with legitimate concerns about journalistic ethics in the games industry. However, analysis of the emergence of the Twitter hashtag and its rise in popularity has revealed that interest was generated through the coordinated efforts of a relatively small group of politically motivated 4chan users with the help of dummy Twitter accounts used to boost the signal.

Just days after Gjoni's blog circulated on 4chan, *DailyDot* published a story that cemented the narrative of a designer (Quinn) sleeping with a journalist for a favorable game review. This narrative was initially dubbed the "Quinnspiracy," but within the week, conservative actor Adam Baldwin had fatefully coined the hashtag "#GamerGate" in a tweet linking YouTube videos critical both of Quinn as well as game journalism's apparent embrace of feminism. The videos Baldwin tweeted were far-reaching conspiratorial rants that, at one point, compared Quinn and her sexual relationship with games journalist Nathan Grayson to Richard Nixon and Watergate. The video alleges Quinn and other women in the gaming industry achieved success (and could only achieve success) by sleeping with men in the industry and games press.

Baldwin's tweet is credited with helping to considerably boost the circulation of the journalistic ethics narrative. Mere days after the #GamerGate tweet, far-right national news syndicator and opinion website Breitbart News published an article by Milo Yiannopoulos: "Feminist Bullies Tearing the Video Game Industry Apart." Not only had the narrative reached a national audience, but it had also escalated into the targeting of multiple prominent feminist figures beyond Quinn, such as Anita Sarkeesian and Brianna Wu, as well as anyone who defended them. Quinn, Sarkeesian, Wu, and others began experiencing a flood of harassing texts and tweets, ultimately resulting in the cancellation of public appearances and the need in several cases for victims to flee their homes. Quinn did not feel it was safe to return to her home for several months.

It must be noted that as the online harassment campaign unfolded, it also intersected with ongoing popular discourse over representation in gaming. It is difficult to disentangle the harassment from this discourse, as misogyny in gaming communities is one of the problems identified by feminist critics and designers. And feminist efforts to address this problem have been answered by further abuse rather than reasoned discourse. Moreover, although Gamergate is closely tied to the gaming industry, it has wider cultural significance.

Though the claims made about breaches in journalistic ethics have been debunked, there is still legitimate confusion and concern about ethics in games journalism within right-wing internet groups. Many proponents of Gamergate do genuinely believe that white men are being discriminated against and that the widespread rebuke of the hate and harassment directed at women and progressives actually expresses intolerance of conservativism. There is sometimes a fine line between right-wing backlash against progressive voices and outright hate and abuse. But what is clear is how even high-profile arguments, such as Yiannopoulos's article, are coded to appeal to baser impulses while simultaneously providing cover for the vitriol.

Many of these arguments consist merely of ad-hominem attacks directed at feminist game designers and critics. However, Gamergaters also cleverly employ a range of rhetorical strategies very familiar in contemporary American politics, such as counteraccusing pro-feminist critics of their own offenses: for example, it is actually feminists such as Quinn and Sarkeesian who discriminate (against straight, white men), or it is actually progressives who hate women. Another strategy employed is to portray Gamergaters themselves as the true victims (of discrimination, harassment, threats, and doxing). Finally, the mere presence of alternative and independently designed games is characterized as apocalyptic to gaming as we know it, making the possibility of quid pro quo relationships between designers and journalists loom as a serious threat to the industry as a whole.

It is in light of such rhetorical strategies that this entry carefully avoids perpetuating a false balance by describing Gamergate as a "debate" or "controversy" between two opposing teams whose views are equally legitimate and merely differ. Describing Gamergate this way risks embellishing the rhetorical strategy employed by Gamergate proponents to justify a campaign of harassment directed at women (as well as the perpetuation of groundless claims of ethical breaches in journalism) as a mere difference of viewpoint.

Christopher Goetz and David O. Dowling

See also: Social Media

Further Reading

Baio, Andy. "72 Hours of #Gamergate." Medium, October 27, 2014. Available at https://medium.com/message/72-hours-of-gamergate-e00513f7cf5d.

Braithwaite, Andrea. "It's about Ethics in Games Journalism? Gamergaters and Geek Masculinity." *Social Media + Society* 2, no. 4 (2016). Available at https://journals.sagepub.com/doi/10.1177/2056305116672484.

Kidd, Dustin, and Amanda J. Turner, "The #GamerGate Files: Misogyny in the Media." In *Defining Identity and the Changing Scope of Culture in the Digital Age*, edited by Alison Novak and Imaani Jamillah El-Burki, 117–139. Hershey, PA: IGI Global, 2016.

Nieborg, David, and Maxwell Foxman. "Mainstreaming Misogyny: The Beginning of the End and the End of the Beginning in Gamergate Coverage." In *Mediating Misogyny: Gender, Technology & Harassment*, edited by Jacqueline Ryan Vickery and Tracy Everbach, 111–130. New York: Palgrave MacMillan, 2018.

GameCube. *See* Nintendo GameCube

GameLine. *See* CVC GameLine Master Module

Gameplay. *See* Play

Gamers Outreach Foundation

Gamers Outreach Foundation is a nonprofit organization that provides interactive entertainment to children in hospitals around the country. The organization was founded by Zach Wigal and Nick Russell in 2007.

The Gamers Outreach Foundation was created after public safety officials canceled a scheduled *Halo 2: Combat Evolved* (2004) tournament at Saline High School, in Saline, Michigan. The event had been planned by students Zach Wigal and Nick Russell and was to take place in the high school's cafeteria, with over three hundred students expected to participate. After a local police officer (and member of the Parents Television Council) protested the event, the tournament was ultimately canceled. The cancellation of the tournament caused controversy within the local community, and the conflict made the front page of Saline's local newspaper and eventually spread to various television news outlets.

Encouraged by many after the setback, Wigal and Russell set out to host their own tournament, with the intent of raising money for charity and to illustrate the positive aspects of interactive gaming. Working under the title of Gamers for Giving, they organized a *Halo 3* (2007) tournament. More than five hundred participants attended the tournament, and the event raised approximately $15,000 dollars, $4,000 of which was donated to the local chapter of the Autism Society of America. Following this success, the Gamers Outreach Foundation was created, with Gamers for Giving becoming the annual fundraising event for the foundation.

The current focus of Gamers Outreach is to provide interactive entertainment to children in hospitals. Through Project GO Kart, Gamers Outreach utilizes portable kiosks to offer gaming experiences to hospital patients who may have limited access while confined to a medical environment. Currently, the foundation's initiatives serve thousands of children per year throughout the country.

Aaron D. Boothroyd

Further Reading

Gamers for Giving website. Accessed September 16, 2020. Available at http://www.gamersforgiving.org/.

Gamers Outreach website. Accessed September 16, 2020. Available at http://gamersoutreach.org.

Games, Philosophical Critique of

Since Greek antiquity, philosophers have commented on the role of play in human development, often in moral or ethical terms. For example, Plato, Aristotle, and Pascal only discussed games in terms of rules of conduct, associating rules of life with rules of play. Plato (sixth century BCE) saw games as a way to learn about being good citizens. Games teach through actions, good or bad, and their lessons can be applied to the real world outside. Thus, Plato advocated gameplaying on the condition that humans play the "right" games and remain the "puppets" of the gods.

Unlike Plato, Aristotle (fourth century BCE) condemned games, seeing them as a weakness and contending that playful activity distances humans from pure happiness and pleasure. Games may serve as respite amid serious activity but should not be played for sheer fun. This contention echoes that of Herodotus (fifth century BCE), for whom man is like a bow that cannot be held in permanent tension but must release at the right moment. A permanently taut bow will snap, just as a man constantly working goes crazy.

The *Pensées* (1670) of Blaise Pascal (1623–62) added nuance to the Aristotelian view. Pascal argued that games should not be condemned because they are reason based and potentially beneficial. For better or ill, games can divert man from his miserable state. Play can enhance life but ultimately diverts man from the happiness he must discover himself. Play is not inherently sinful, but man must play a "good" game that brings him closer to God and "true" happiness.

Besides this philosophical perspective of games, Pascal also developed a probability theory to calculate a fair division of gaming stakes. This helped build a bridge between the moralists of his time and men of science. From the seventeenth and eighteenth centuries, mathematicians became increasingly interested in games of chance, devising calculations for wagering. For instance, the German Gottfried W. Leibniz (1646–1716) encouraged the study of games, recognizing man's great ingenuity and creativity in this area. Freed of life's constraints, games spark human inventiveness and stimulate great minds.

Nonetheless, in the West, playful activity was still seen as childish. At the end of the eighteenth century, the *Encyclopédie* (1751–66) of Diderot and d'Alembert described gaming as conventional and frivolous, primarily money driven, and risky in terms of wagering, chance, and uncertain outcome. However, gaming could be legitimate if restrained from excess and with fair criteria among players.

Immanuel Kant (1724–1804) distinguished games from work. Without confusing the two, children learn about limitations from the coercive aspect of work. Although games are inherently fun, work has a purpose that may take pains to achieve. Games should not impinge on schooling but can play an essential role in education: games promote human development. Fredrich von Schiller (1759–1805) further developed this idea in perceiving play as a meeting point of the rational (intelligible) and the experiential (empirical). Schiller attributes an aesthetic value to games and puts the metaphysical concept developed in ancient Greece in a relativist context.

Until the end of the nineteenth century, philosophers held sway in speculating about games but never really questioned their essential nature. Games were not deemed a subject of study in themselves but cropped up sporadically in writings on other topics. The classification of games was sometimes discussed, but most considerations dwelled on the moral aspect: for example, should human beings play, or should children play during periods of learning?

As the nineteenth century drew to a close, however, the subject of games gained status as a valid research topic in such disciplines as biology, anthropology, psychology, and sociology. Karl Groos (1861–1946), for instance, wrote about the play of animals (in *Die Spiele der Tiere* [1896]) and of human beings (in *Die Spiele der Menschen* [1899]), describing playfulness as a biological function. Stewart Culin (1858–1929) took an ethnographic approach, studying games among different peoples (Chinese, American Indian, Japanese, etc.) from 1889 to 1925. Other authors, such as M. G. Hartgenbusch (*Beobachtungen und Bemerkungen zur Psychologie des Sports* [1926]) and Maurice Merleau-Ponty (1908–61), analyzed the psychologies of players. Psychologists also explored the question of play among children, and Jean Piaget, among others, developed a categorization of games based on the developmental stages of children. Ludwig Wittgenstein (1889–1951) also formulated a theory of language games that would influence philosophy. John Von Neumann (1903–57) and Oskar Morgenstern (1902–77) published a major mathematical work on the fundamentals of game theory entitled *Theory of Games and Economic Behavior* (1944), which became widely known and is still studied in economics and political science.

A qualitative approach to the study of games was also forming. Dutch historian and anthropologist Johan Huizinga published *Homo Ludens* (1938), which is entirely devoted to games, in which he maintained that games beget culture. For the first time in history, the structure of games themselves was examined in depth, and Huizinga advanced a new definition of *games* (see Games, Definition of). This celebrated work would influence several generations of researchers in games studies, arguably earning Huizinga the distinction of being the founding father of the discipline. It must be noted, however, that his essay draws on *Kulturgeschichte Afrikas* (1933) by Leo Frobenius (1873–1938), which had already begun to set the basis for studies on games.

Inspired by Huizinga, the Frenchman Roger Caillois furthered game analysis by publishing *Les Jeux et les Hommes* (1958). Among other things, the work proposed a categorization of games that would be widely adopted (*agôn*, *alea*, *mimicry*, and *ilinx*). Shortly after this, the German philosopher Eugen Fink wrote the first philosophical book entirely devoted to games and play. Fink, a student of Edmund Husserl and Martin Heidegger, wrote *Spiel als Weltsymbol* (1960), in which he asserted that play can be understood as a symbol of our relationship to the world. Since then, games are no longer seen as a trivial subject of study. After 1960 and the birth of video games, a tremendous surge in writing on games ensued, and before long, the discipline of video game studies officially emerged. In this new discipline, more and more authors studying both the concept of game (Henriot, Axelos, Suits, etc.) as well as video games (Wolf, Cogburn, Silcox, Sicart, etc.) adopted a philosophical perspective.

Since 2000, the philosophical study of games has become a more common interest for scholars. In 2005, a group of Norwegian scholars and the Center for Computer Games Research at the IT University of Copenhagen organized a seminar dedicated to the ontological issues raised by computer games. Since then, an organization called the Game Philosophy Network has regrouped many researchers working on philosophical questions related to video games with an annual international conference. The book *The Philosophy of Computer Games* (2012), published by some of the Network members, demonstrates the contemporary concerns of the interdisciplinary field of the philosophical study of games.

Maude Bonenfant

See also: Art, Video Games As; Game Design

Further Reading

Caillois, Roger. *Les Jeux et les Hommes* (*Games and Man*). Paris, France: Gallimard, 1958.

Cogburn, Jon, and Mark Silcox. *Philosophy through Video Games*. New York: Routledge, 2008.

Cuddy, Luke, and John Nordlinger, eds. *World of Warcraft and Philosophy*. Chicago: Open Court, Popular Culture and Philosophy, 2009.

Fink, Eugen. *Spiel als Weltsymbol*. Stuttgart: W. Kohlhammer Verlag, 1960.

Frobenius, Leo. *Kulturgeschichte Afrikas*. Vienna: Phaidon-Verlag, 1933.

Huizinga, Johan. *Homo Ludens*. Denmark: Saga Egmont, 1938.

Pascal, Blaise. *Pensées*. Paris: Port-Royal, 1670.

Sageng, J. R., H. J. Fossheim, and T. M. Larsen, eds. *The Philosophy of Computer Games*. Vol. 7. Berlin, Germany: Springer Science & Business Media, 2012.

Sicart, Miguel. *The Ethics of Computer Games*. Cambridge, MA: MIT Press, 2009.

Wolf, Mark J. P., ed. *Virtual Morality: Morals, Ethics and New Media*. New York: Peter Lang Publishing, 2003.

Games and Culture

Games and Culture: A Journal of Interactive Media is a peer-reviewed academic journal that provides a forum for scholarship and research in games, gameplay, and culture. Video games are the principal focus, yet board games and interactive media are also within scope. The journal is published eight times per year and has paper and online versions. American scholar, researcher, and journalist Douglas Thomas was the journal's founder and first editor in chief, establishing the journal in 2006 with SAGE Publications. British scholar and researcher Tanya Krzywinska became editor in chief in 2014.

Games and Culture promotes innovative theoretical and empirical research about games and culture. It serves the games research community as an outlet for groundbreaking work in the field of game studies. Its scope is wide and welcomes interdisciplinarity, providing a forum for research that comes from a wide and eclectic range of methodological approaches. Within the journal, a similarly wide range of topics can be found. There are critical analyses of game design, from workflow methodologies to labor relations; you will find papers on the ethics of loot boxes alongside more philosophical discussions of aesthetics. Player studies are commonly represented in the journal; ethnographical and empirical studies focusing on game culture, perhaps in the context of multiplayer games, appear besides analyses of the rise of game spectatorship and esports. The uses of games in education contexts is also a common area for study, while focus on developments in games technologies, interfaces, haptics, and display are also analyzed in terms of cultural impact. In a general sense, the journal seeks game studies–based work that explore the sociocultural, philosophical, political, and economic design, aesthetic, and formal dimensions of games. Broadly, its area of interest sits within the context of culture studies and media studies, welcoming empirical as well critical approaches.

Special issues of the journal have focused on specific topics that are either current or on which it would be helpful to collect a number of different viewpoints, and methodological perspectives are also welcomed by the editorial team. Special editions often come out of a conference. Topics of special issues in recent years have included Ludic Economies, Games and Empire, Games and Aging, Morality Play, Reflecting and Evaluating Game Studies, Games & Gaming in China, Casual Games, Games and Literature, and Adult Play.

In the broadest sense, the journal aims to promote and invigorate dialogue among the academic, design, development, and research communities that will influence both game design and research about games within various public contexts. It also seeks to examine how gaming and interactive media are used outside of entertainment, including in education, for the purposes of training, for military simulation, and for political action.

All submissions are peer reviewed by two or more members of the distinguished, multidisciplinary editorial board. *Games and Culture* aims to have all papers go through their initial review within three months of receipt. Manuscripts should be submitted electronically in Word or WordPerfect format and conform to the *Publication Manual of the American Psychological Association* (seventh edition) and should not exceed eight thousand words in length.

Tanya Krzywinska

Further Reading

Games and Culture website. Accessed September 16, 2020. Available at https://us.sagepub.com/en-us/nam/journal/games-and-culture.

Games Done Quick (GDQ)

Games Done Quick (GDQ) is a series of video game speedrun marathons for charity, using a telethon model. Two annual events make up the bulk of the GDQ activities, Awesome Games Done Quick (AGDQ) and Summer Games Done Quick (SGDQ), and there are additional one-off events. They are broadcast on the streaming website Twitch.tv, where spectators are incentivized to donate through several means, notably shout-outs on the stream and voting for different objectives on speedruns. The live speedruns are then archived on YouTube for posterity. There is also a live audience at the event, usually run in the greater Washington area for AGDQ and in Minnesota for SGDQ. They have more or less become minifestivals celebrating speedrunning, with over one thousand attending and over $1 million raised per event (up from twenty attendees that raised $10,000 at the initial event). The initial donation was to the poverty-prevention organization CARE, but the bulk of the donations have been to the Prevent Cancer Foundation and Doctors without Borders. The events feature real-time commentary; a counter for money raised, reminiscent of the telethon model; and various speedrunning categories, a variety of games, and special features, such as blindfolded speedruns or tool-assisted speedruns.

The first GDQ event, then named Classic Games Done Quick, happened in 2009 and was run by several members of Speed Demo Archives (SDA), an online speedrunning community as well as an archive website. This first event was mainly organized by Mike Uyama, considered to be the founder of the GDQ marathons. The “Done Quick” suffix in the name came from the origin of SDA, which was created after the merging of two *Quake*-focused websites in 1998 and featured speedrun archives titled “Quake Done Quick.” The resulting website was officially open to all games (rather than only *Quake*) in 2004. As evidenced by its name, Classic Games Done Quick was focused on retrogames, which eventually changed to feature more modern games for added variety and broader appeal. The idea was largely inspired by a marathon (for charity) of the game *Desert Bus* (1995) by the group LoadingReadyRun in 2007, which also became a charity marathon series. The 2009 marathon was originally organized to be at MAGFest, the Music and Games Festival, but was eventually moved to the organizer’s house due to technical issues. It was broadcast on UStream at the time, which eventually changed to Twitch as it gained in popularity. In 2010, the events officially became annual under the AGDQ title.

For some, this kind of event is considered to be a “tangible purpose” for the hobby of speedrunning, giving it a “real, lasting effect in the world” (Koziel 2019, 18). Rather than chasing world records for their own sake, the events are made to feature the speedrunning community at its best. They bring speedruns to a greater audience as well as raise funds for charities, rewarding speedrunners’ efforts and work as a community.

Ophélie Bernard

See also: Speedruns

Further Reading

Koziel, E. *Speedrun Science: A Long Guide to Short Playthroughs*. Tucson, AZ: Fangamer, 2019, 14–19.

Riendeau, D. "Zen and the Art of Speedrunning." *The Escapist*, June 23, 2009. Available at https://v1.escapistmagazine.com/articles/view/video-games/issues/issue_207/6192-Zen-and-the-Art-of-Speedrunning.

Varney, A. "Speed Thrills." *The Escapist*, July 4, 2006. Available at https://v1.escapistmagazine.com/articles/view/video-games/issues/issue_52/315-Speed-Thrills.

Gamification

When one talks about allegedly new and playful approaches to health, wellness, tourism, journalism, marketing, or education, gamification ranks high on the list of chosen buzzwords. Yet, little research has been undertaken as to where borders have been drawn before the proposed invention of the gamification concept in the second decade of the twenty-first century. Gamification may, or may not, be an original feature of digital cultures.

The consistent use of the term *gamification* for the permeation of extraludic terrain with game-related methods, metaphors, and objects began in the early 2010s. Much earlier, Huizinga's proposal that culture has its roots in play (1938), Caillois's typology of games (1958), and Sutton-Smith's investigation into toys as culture (1997) all insisted on the transformative power of play. These play and game theories acknowledged that games may influence the nonludic sectors of society. Around the millennial turn, a multitude of theories have been presented and discussed to make a strong argument for play as the driving force of culture. In English-speaking countries, Pelling (2002), Schell (2010), and Deterding et al. (2011) referred to this process as "gamification" or "ludification" (Raessens 2006). In German academia, Rötzer theorized about "Spielkultur" (1995), the culture of games, and Böhm proposed a "Ludifizierung" (2011) to have happened in the context of learning and teaching. With a focus on the dialectics of work and play, Kirkpatrick introduced the notion of "ludefaction" (2015). But neither Böhm's nor Kirkpatrick's terminological creations took off very well, nor did Ian Bogost's provocative coinage "exploitationware," a term the author introduced polemically to unmask the fraudulent labeling of a new form of exploitation as gamification.

Today, the term *gamification* is widely used, and it describes a vogue of methods, metaphors, and objects from the regime of games and playfulness to be used in nongaming contexts. This gamification of work, leisure, education, and casual contexts has been interpreted as an aestheticization of the social by some

(Reckwitz 2012). For more pragmatic thinkers and management consultants, gamification is rather a tool to increase customer loyalty and a means to reach out to new client populations (Zichermann and Cunningham 2011; Werbach and Hunter 2012). They seem to hope for increased efficiency by simply adding "game design elements" (Deterding et al. 2011).

Taking a different perspective, Joost Raessens embeds gamification in a context of cultural history, and of media history in particular, when he speaks about "ludification" (2006) and finds evidence for it in television formats, the aesthetics of advertisements, and election campaign strategies. Others are looking for a critique of gamification against the background of neoliberal politics, new Fordism, critique of ideology, or Marxist analysis of the political economy (Escribano 2012; Fuchs et al. 2014; deWinter, Kocurek, and Nichols 2014; Kirkpatrick 2015; Rautzenberg 2015). What they may have in common is that they critically examine gamification as a central moment for the analysis of current formations of society. In reference to political and social changes, as well as progressing digitization processes in the context of neoliberalism, Rolf Nohr, for example, interprets gamification as "one of the central constellations of the society of control" (Nohr 2015, 205).

A (cultural) history of gamification and the systematic relationship between the playful and the nonplayful, which must always be renegotiated historically, is certainly inevitable for a deeper understanding of gamification. What is "far from the game" and what is genuinely "playful," and when and how this difference was justified, is often a precedent made without reflection on the basis of which transfer processes are then negotiated.

Gamification theories of the last fifteen years allow, on the one hand, a changed understanding and a new perspective on historical semantics of games. They allow us to read "classical" game theories in a new and different way because they dismiss problematic concepts (such as those of the magic circle or the "difference to ordinary life" [Huizinga 1938]) and offer alternative ways of understanding what is considered a game. On the other hand, it can be shown that phenomena of gamification extend far back in time from their current manifestations and the genesis of contemporary (digital) cultures and also that they have a decisive influence on them, for example, in preliminary cultural decisions regarding what is playful versus nonplayful. A historical comparative perspective opens up the view to the extent to which observations of gamification processes have always been products of shifts in the respective boundaries between playful and (still) nonplayful domains. For what is regarded as a "playful element" and what is regarded as a "nonplayful context" is historically definitely contingent. It is worth investigating how digitality reinvests and contextualizes the demarcation between the ludic and the nonludic at present and which new original qualities of gamification result from it.

For this goal, the definition of *gamification* as a "use of computer game elements in non-game areas" (Deterding et al. 2011), which is commonly used in research, is inadequate. Deterding himself is aware that his proposal, originally labeled a "definition," requires a broader investigation. In an editorial in the journal *Computers in Human Behavior*, he and his coauthor, Lennart E. Nacke, ask for rethinking what gamification is today. The authors are aware that gamification theory has to enter a new stage when they write about "the maturing of gamification research” (Nacke and Deterding 2017). This could be taken up by understanding gamification as a constantly renegotiable cultural difference and historical contextualizing of the current debate. Whatever we want to call ludic is dependent on the observer and historical variables. Aspects of life and society might be considered non-ludic by some and ludic by others. And what we call ludic now might be considered non-ludic tomorrow—all this is dependent on the observer and historical variables. Taking this variability into account critically will expand existing gamification research and will enable us to locate gamification beyond a design-specific logic.

Mathias Fuchs

Further Reading

Bogost, I. “Gamification Is Bullshit! My Position Statement at the Wharton Gamification Symposium.” In *Ian Bogost* (blog), August 8, 2011. Available at http://www.bogost.com/blog/gamification_is_bullshit.shtml.

Böhm, W. *Entwürfe zu einer Pädagogik der Person. Gesammelte Aufsätze*. Bad Heilbrunn, Germany: Klinkhardt, 2011.

Caillois, R. *Les jeux et les hommes*. Paris, France: Gallimard, 1958.

Deterding, S., D. Dixon, R. Khaled, and L. Nacke. “From Game Design Elements to Gamefulness: Defining Gamification.” In *Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments*, 9–15. New York: ACM Publications, 2011.

deWinter, J., C. A. Kocurek, and R. Nichols. “Taylorism 2.0: Gamification, Scientific Management and the Capitalist Appropriation of Play.” *Journal of Gaming and Virtual Worlds* 6, no. 2 (2014): 109–127.

Escribano, F. “Gamification as the Modern Phalanstère.” In *The Video Game Industry: Formation, Present State, and Future*, edited by P. Zackariasson and T. Wilson, 198–217. London: Routledge, 2012.

Fuchs, M., S. Fizek, N. Schrape, and P. Ruffino. *Rethinking Gamification*. Lüneburg, Germany: Meson Press, 2014.

Huizinga, J. *Homo ludens. Vom Ursprung der Kultur im Spiel*. Hamburg, Germany: Rowohlt, 1956 [1938].

Kirkpatrick G. “Ludefaction: Fracking of the Radical Imaginary.” *Games and Culture* 10, no. 6 (2015): 507–524.

Nacke, L. E., and S. Deterding. “The Maturing of Gamification Research.” *Computers in Human Behavior* 71 (2017): 450–454.

Nohr, R. F. “‘Now Let’s Continue Testing’: *Portal* and the Rat in a Maze.” In *The Cake Is a Lie!: Polyperspektivische Betrachtungen des Computerspiels am Beispiel von, Portal*, edited by T. Hensel, B. Neitzel, and R. F. Nohr, 199–224. Münster, Germany: LIT, 2015.

Pelling, N. Conundra webpage, 2002. Available at http://www.nanodome.com/conundra.co.uk/.

Raessens, J. “Playful Identities, or the Ludification of Culture.” *Games and Culture* 1, no. 1 (2006): 52–57.

Rautzenberg, M. “Navigating Uncertainty: Ludic Epistemology in an Age of New

Essentialism." In *Diversity of Play*, edited by M. Fuchs, 83–106. Lüneburg, Germany: Meson Press, 2015.

Reckwitz, A. *Die Erfindung der Kreativität: Zum Prozess gesellschaftlicher Ästhetisierung*. Frankfurt, Germany: Suhrkamp, 2012.

Rötzer, F. *Schöne neue Welten? Auf dem Weg zu einer neuen Spielkultur.* Boer, 1995.

Schell, J. *When Games Invade Real Life*, 2010. Available at http://www.ted.com/talks/jesse_schell_when_games_invade_real_life.html.

Sutton-Smith, B. *The Ambiguity of Play*. Cambridge, MA: Harvard University Press, 1997.

Sutton-Smith, B., and R. E. Herron, eds. *Child's Play*. Malaber, Australia: Warrior Books, 1971.

Werbach, K., and D. Hunter. *For the Win: How Game Thinking Can Revolutionize Your Business*. Philadelphia, PA: Wharton Digital Press, 2012.

Zichermann, G., and C. Cunningham. *Gamification by Design: Implementing Game Mechanics in Web and Mobile Apps*. Sebastopol, CA: O'Reilly, 2011.

Garriott, Richard (1961–)

Richard Garriott is the creator of the influential *Ultima* series of role-playing games (RPGs), and he played an instrumental role in the creation of *Ultima Online* (1997), the first highly successful commercial massively multiplayer online role-playing game (MMORPG).

Garriott's father is Owen Garriott, a former NASA astronaut, and his mother, Helen, was an artist. Garriott was born in Cambridge, England, on July 4, 1961, and spent his childhood in the Houston, Texas, area. He started to learn computer programming in high school and at an extensive summer programming camp at Oklahoma State University in 1977. He used his high school computer programming project to develop his first computer RPG, *Akalabeth: World of Doom*, in 1979. Although Garriott initially printed only a handful of copies to sell in the local computer shop that he worked in, California Pacific Computer Company published it in 1980 and eventually sold thirty thousand copies.

Garriott dropped out of the university to work on additional games. California Pacific published *Ultima* in 1980 but then went bankrupt. Garriott then published *Ultima II: Revenge of the Enchantress* in 1982 with Sierra On-Line (see Sierra Entertainment) because they were the only publisher willing to meet his demands for high-quality box printing and cloth maps, both of which were unusual at the time. In 1983, with support from his father, he founded Origin Systems with his brother Robert (who ran the business side of operations) and his friend Chuck Bueche. Origin eventually published a large number of games, including the well-known *Wing Commander* series. Garriott's focus, however, was the *Ultima* series. Origin went on to release *Ultima III: Exodus* (1983), *Ultima IV: Quest of the Avatar* (1985), *Ultima V: Warriors of Destiny* (1988), *Ultima VI: The False Prophet* (1990), and *Ultima VII: The Black Gate* (1992).

In the first few games in the *Ultima* series, Garriott was the primary creator of the games and did most of the programming and artwork. As Origin grew in size, however, more and more people participated in constructing the games, and *Ultima V* was the last game for which Garriott did any coding; afterward, he moved into the role of creative director. Garriott did not deal well with the stress of running his own business, however, and in 1992, the Garriott brothers sold Origin to Electronic Arts (EA).

In the mid-1990s, Garriott split his time and energy between continuing the *Ultima* single-player games (*Ultima VIII: Pagan* [1994] and *Ultima IX: Ascension* [1999]) and developing *Ultima Online* (1997), which would go on to be the first significantly successful internet-based graphical MMORPG. Garriott was increasingly unhappy with EA and left Origin in 2000 to found Destination Games with his brother and *Ultima Online* producer Starr Long.

A year later, this new company merged with MMORPG-maker NCSoft and became the American branch of the corporation. The studio released *Tabula Rasa* (2007), a project Garriott had been working on for many years. The game fell short of NCSoft's expectations, and the company shut it down after about a year of operation. Garriott left the company, apparently willingly, in the fall of 2008, but he filed a lawsuit against NCSoft in the spring of 2009 in which he alleged that he had been forced out. He ultimately won $28 million in damages in a lawsuit against the company.

Garriott went on to work on the massively multiplayer online (MMO) game *Shroud of the Avatar*, announced in March 2013, launching a Kickstarter campaign that raised $1.9 million. The development team stated that they wanted to create the game in a very open manner, drawing on support from their large community of backers. However, when the game finally launched in March 2018, after a long period in Early Access on Steam, it received poor reviews.

Garriott is well known for a variety of eccentric behaviors. He has been a participant in the Society for Creative Anachronisms since the early 1980s and will often appear at public functions in Renaissance-themed clothing as his alter ego Lord British. He has built two mansions in the Austin area, each called Britannia Manor, that are full of unique architectural features, such as a dungeon and an observatory. The first house was famous for being the site of extraordinarily elaborate Halloween haunted house shows. Garriott is also famous for his exotic trips, including two expeditions to Antarctica, deep-sea submersible voyages, and a well-publicized trip to the International Space Station in the fall of 2008.

Kevin Schut

See also: *Ultima* Series

Further Reading

Campbell, Colin. "Richard Garriott: The Man, the Myth, the Mischief." Polygon, January 30, 2017. Available at https://www.polygon.com/features/2017/1/30/14406074/richard-garriott-book-interview.

DeMaria, Rusel, and Johnny L. Wilson. *High Score! The Illustrated History of Electronic Games*. Berkeley, CA: McGraw-Hill/Osborne, 2002.

King, B., and J. Borland. *Dungeons and Dreamers: The Rise of Computer Game*

Culture from Geek to Chic. New York: McGraw-Hill/Osborne, 2003.

GCE/Milton Bradley Vectrex

The GCE/Milton Bradley Vectrex was a second-generation (see Generations of Technology) home video game console and the first and only home video game system to use vector graphics (see Vector Games). Introduced in November 1982, it was developed by Smith Engineering/Western Technologies and licensed to and distributed first by General Consumer Electric and later by the Milton Bradley Company.

The Vectrex was meant to bring arcade-quality games home and was initially called the Mini Arcade. Based on the Motorola 68A09 8-bit CPU, operating at 1.5 MHz, the system included 1 KB of random access memory (RAM) and 8 KB of read-only memory (ROM), and its three-voice sound was produced by a General Instruments AY-3-8912 chip. A self-contained system, the Vectrex sported a built-in nine-inch monitor with a vertically oriented screen. The display was black and white, with plastic screen overlays used to add color and background decorations to the games. The controller utilized a self-centering analog joystick (for the first time in a home system) and four buttons. When not in use, it slotted into the base beneath the monitor for convenient storage or transportation.

The Vectrex featured one built-in game, *MineStorm* (1982), which was an *Asteroids* (1979) clone. Additional games were distributed on cartridges. Thirteen titles were available at launch, of which eight were licensed conversions of existing coin-op games (most of them from Cinematronics, including *Space Wars* [1977], *Armor Attack* [1980], and *Rip Off* [1980]), while the remaining five had been developed by GCE.

The system launched at $199 and enjoyed moderately successful initial sales. Following Milton Bradley's purchase of GCE, the system was also distributed in Europe and, in a cobranding agreement with Bandai, in Japan. There were twenty-seven commercially released cartridges. The Vectrex also received two official peripherals: a light pen and an electromechanical 3-D imager.

A color version of the system was in development but was never released. Also planned was a computer add-on, with 16 KB memory (expandable to 64 KB), a full QWERTY keyboard, and a BASIC cartridge. With the ability to connect a printer, a mass storage drive, and a modem, the add-on would have transformed the system into a fully featured home computer but never left the planning stage.

When Vectrex sales floundered in the wake of the video game crash of 1983, Milton Bradley shut down GCE in early 1984 and discontinued the Vectrex shortly thereafter. Barely over a year on the market, the Vectrex enjoyed one of the shortest commercial life spans of all home consoles.

Following the closing of GCE, Jay Smith, of Smith Engineering, reacquired the rights to the Vectrex hardware and software and released them into the public domain for nonprofit use in 1996. While the system's uniqueness had already guaranteed it a cult following among retrogaming enthusiasts, Smith's move opened the door wide for the development of homebrew games, with the first title (John Dondzila's *Vector Vaders*—a *Space Invaders* [1978] conversion) released the same year. Since 1996, nearly ninety titles have been released (including original games, conversions, modifications, and hacks), making the Vectrex one of the most popular homebrew platforms.

P. Konrad Budziszewski

See also: Vector Games

Further Reading

Allen, Matt. "Retroinspection: Vectrex." *Retro Gamer* 35 (2007): 18–25.

"Vectrex." *Games*, October 24, 2004: 142–145.

Vectrex Museum website. Accessed September 16, 2020. Available at http://www.vectrexmuseum.com.

Vectrex website. Accessed September 16, 2020. Available at http://www.vectrex.com.

GDC. *See* Game Developers Conference

Gender

In trying to better understand the content of video games as well as who plays them and why, games scholars have paid a great deal of attention over the past two decades to studying issues of gender. That work has fallen into several categories or areas, including representations of female characters in games, the interests and experiences of female players, and the composition of the game industry in terms of demographic representation. Few scholars have studied male gamers and their own gendered uses of video games, but that is starting to change. As with video games themselves, findings in these areas are constantly evolving as we see new types of games, new platforms, new players, and new business models emerge.

Some of the earliest work on gender and games focused on the content of video games, asking what kinds of images of female characters were being presented to the player. The answer was that there were actually very few female characters portrayed in video games of the late 1980s and through the 1990s. Of those female characters that did appear, many were stereotypical in their appearance (overly sexy and wearing revealing clothes) or in their actions (as princesses in need of rescue). The female characters that did break out of such roles were few and far between and were often nonhuman or played minor roles in the game. In contrast, male characters were the drivers of the action and yet were also often drawn from stereotypes and limited types.

Research on how female characters evolved past the 1990s does not suggest that much has changed. Large-scale studies of the top-selling games across multiple platforms confirm that female characters—particularly the central playable character in games—are only the lead in about 10–15 percent of games. And they remain hypersexualized and trapped in limiting roles.

In response, some researchers have looked past the images of females in video games to see whether the actions of the characters are any better. In that regard, scholars have argued that even if characters have stereotypical appearances, they might still drive the action and thus represent a more powerful portrayal than a princess in need of rescue. Certainly, the growing prevalence of games that allow players to choose their avatar's gender, and possibly even their appearance, has also helped to broaden the potential for more female characters in games, particularly in the realm of massively multiplayer online role-playing games (MMORPGs) such as *World of Warcraft* (*WoW* [2004]) and role-playing games (RPGs) such as *Mass Effect* (2007). The reboot of the *Tomb Raider* series in 2015 demonstrated that female lead characters can be profitable, leading to the additional presence of women and girl characters in games such as *Life Is Strange* (2015), *Hellblade: Senua's Sacrifice* (2017), and *Horizon Zero Dawn* (2017). Likewise, the growing popularity of casual games and now mobile games has led to certain genres (e.g., hidden object games, time management games, and puzzle games) that feature many more female characters as the lead playable character in a wider range of ages and occupations than traditional console-based games have allowed.

Another popular area for research has been the study of players and their interests and preferences in gameplay. Early research sought to understand whether girls and women had different preferences than boys and men for types of games or the activities within games themselves. Some early research found girls and women less interested in violence and competition and more focused on social, cooperative experiences that also featured strong narrative components. More recently, researchers have found those differences to be diminishing, although certain genres of games—such as first-person shooting games—still tend to appeal more to younger male players than other demographic groups. Other studies have shown that some of the early differences among female players were more likely due to their relative newness to gameplaying rather than their gender. Furthermore, there are differences between different age groups of women and players with different playing frequencies that might matter more than simple male/female differences. More recently, scholars have started explicitly studying male players—particularly those in adolescence—and find that they often play games to reduce tension and work through anger that results from their daily lives. Others have found that male gamers are often surprisingly multimodal; they still enjoy the pleasures that other media can provide, including books and film.

Some researchers have taken female players as the starting point, asking those who do enjoy competitive, often violent games what they find engaging and rewarding about them. Their answers are similar to those of male players: they take pleasure in gaining skill and expertise and enjoy the competitive aspects of certain games. Likewise, other researchers have pointed out that being social is not necessarily a female preference; many male players enjoy socializing via games as well. Recent studies of MMORPG players also suggest that female players may be the "hardest of the hard core" in that, of those who played the game the most, women were the most excessive in their gameplay and were much less likely to have plans to quit the game. Likewise, significant numbers of female players of casual and social games also report frequent long gameplay sessions, suggesting that the gender gap in time and devotion to play may be diminishing or may disappear entirely in the near future.

One other area for research that relates to gender is the least explored and yet has the greatest future potential implications. Researchers have studied the composition of the game industry and the beliefs and practices of women working there. The game industry is still estimated to be about 85–90 percent male dominated, with women concentrated in certain areas, especially art, animation, and production, and there are a small number of female programmers and designers. However, many of the most well-known developers continue to be male, and most start-up game companies are created by male developers. Researchers have explored why this is so and suggest that it is due to a variety of factors, including the unabated use of “crunch time” in the industry, an insistence on a passion for playing particular types of games, sexism in the industry itself, and a lack of role models. Whether these trends will continue with the growing popularity of social, casual, and gestural-based gameplay is an open question.

In conclusion, the study of gender and games is evolving and paints a mixed picture of video game content and player activities and interests. Most of the research has focused on gender in terms of female players; however, with a few exceptions, researchers have not specifically taken up masculinity and gameplay, instead leaving it as an unmarked category when referencing “the player.” Yet, the growing diversity of platforms for games, including mobile phones, consoles, and computers, and the emergence of new genres of games, such as social and casual games, points to the need to continue to investigate what games offer and who is playing them and why.

Mia Consalvo

See also: Femininity; Masculinity

Further Reading

Burrill, Derek A. *Die Tryin’: Videogames, Masculinity and Culture*. New York: Peter Lang, 2008.

Chess, Shira. *Ready Player Two: Women Players and Designed Identity*. Minneapolis: University of Minnesota Press, 2017.

Consalvo, Mia. “Hardcore Casual: Game Culture *Return(s) to Ravenhearst*.” Paper presented at the Foundations of Digital Games Conference, Orlando, Florida, April 26–30, 2009.

Dietz, Tracy. “An Examination of Violence and Gender Role Portrayals in Video Games: Implications for Gender Socialization and Aggressive Behavior.” *Sex Roles* 38, nos. 5–6 (1998): 425–442.

Hunt, Stacey. “The Shrines to What They Love: Exploring Boys’ Uses and Gratifications of Media in Their Personal Spaces.” In *Mediated Boyhood: Boys, Teens, and Young Men in Popular Media and Culture*, edited by Annette Wannamaker, 197–217. New York: Peter Lang, 2011.

Kinder, Marsha. *Playing with Power in Movies, Television and Video Games: From Muppet Babies to Teenage Mutant Ninja Turtles*. Berkeley: University of California Press, 1991.

Provenzo, Eugene. *Video Kids: Making Sense of Nintendo*. Cambridge, MA: Harvard

University Press, 1991.

Schleiner, Anne-Marie. "Does Lara Croft Wear Fake Polygons? Gender and Gender-Role Subversion in Computer Adventure Games." *Leonardo* 34, no. 3 (1998). Available at http://muse.jhu.edu/journals/leonardo/v034/34.3schleiner.html.

Taylor, Nicholas, and Gerald Voorhees, eds. *Masculinities in Play*. London: Palgrave Macmillan, 2018.

Taylor, T. L. *Play between Worlds*. Cambridge, MA: MIT Press, 2006.

Williams, Dmitri, Mia Consalvo, Scott Caplan, and Nick Yee. "Looking for Gender (LFG): Gender Roles and Behaviors among Online Gamers." *Journal of Communication* 59 (2009): 700–725.

Williams, Dmitri, Nicole Martins, Mia Consalvo, and James Ivory. "The Virtual Census: Representations of Gender, Race and Age in Video Games." *New Media & Society* 11, no. 5 (2009): 814–834.

Genealogies. *See* Game Genealogies

Generations of Technology

Home video game consoles are often grouped together by both their active retail life span and their technological underpinnings. Market influences tend to cause hardware manufacturers to produce new consoles within a few years of their contemporaries. This cycle of development and production has produced video game hardware technology that can be organized into roughly eight generations. Although not comprehensive, this list represents the most popular and influential hardware releases of major companies from a U.S.-centric perspective. The narrative of console generations to mark video game history is useful when discussing certain aspects of continuity in the U.S. game hardware industry, but it does not reflect other parts of game production, such as PC, handheld, and mobile hardware, nor hobbyist and noncommercial development and distribution.

FIRST GENERATION (1972–77)

The first generation of consoles is defined by dedicated systems that connected to a television to play hardwired games. In response to engineering and cost restrictions, dedicated consoles used discrete logic circuits instead of microprocessors to run the games built into the hardware. Some home consoles only played a single game, whereas others featured a switching mechanism to select between available games. The first of these, the Magnavox Odyssey, was released in 1972 and used cartridge-like boards that consisted of the hardware necessary to switch between the games hardwired into the console's circuitry. A number of "table tennis" consoles also came to market during the era of the Odyssey. Atari released its *Home PONG* through the Sears department store under the label of Tele-Games in 1975. Coleco released the original Telstar console, which featured three *PONG*-like variants in 1976 but continued to evolve the Telstar line of products to include technological upgrades as well as new hardwired games and their variations.

SECOND GENERATION (1976–84)

Although dedicated hardware served the early purpose of getting video games out of arcades and into people's living rooms, the second generation focused on building hardware that could run interchangeable software cartridges. To accomplish this, consoles were designed with inexpensive microprocessors and random access memory (RAM). The first of these was the Fairchild Video Entertainment System (later renamed Channel F), which launched in 1976 as the first cartridge-based home console (DeMaria and Wilson 2002, 29). In addition to the tennis and hockey games hardwired into the console, the Fairchild VES could read "videocarts" with multiple games stored on microchips. Having already made its name with the immensely successful arcade and home versions of *PONG* (1972), Atari's Allan Alcorn conceived of the Atari Video Computer System (VCS; later renamed the Atari 2600) as "a system or base unit that was flexible enough to play a lot of kinds of games" (DeMaria and Wilson 2002, 36). In designing the VCS, Atari needed both an inexpensive microprocessor and inexpensive graphics and sound adapter to keep the price down (Monfort and Bogost 2009, 13). The second generation of consoles all faced this balancing act of finding innovative ways of maximizing the potential of affordable hardware.

Other systems of the second generation include the Mattel Intellivision released in 1979 and the Atari 5200 and the ColecoVision, which were both released in 1982.

Third GENERATION (1983–95)

The third generation began in Japan in 1983 with the release of the Nintendo Famicon (later renamed the Nintendo Entertainment System (NES) for its North American release). The third generation of consoles offered greater processing power and expanded color palettes and was the first to employ hardware-based scrolling. Hardware-based scrolling had previously been available in some arcade games, but home consoles of the previous generation used single-screen environments like *Combat* (1977) or *Kaboom!* (1981), cut between screens as in *Adventure* (1979) and *Pitfall!* (1982), or simulated scrolling by moving sprites (as in *Barnstorming* [1982] or *Cosmic Commuter* [1985]). Hardware-based scrolling enabled home consoles to evolve some of the most familiar genres of games and bring arcade games to the home: platform games such as *Super Mario Bros.* (1985) and *Alex Kidd in Miracle World* (1986), side-scrolling shooting games such as *Gradius* (1986) and *R-Type* (1988), and fighting games such as *Kung Fu* (1985) and *Double Dragon* (1988).

Third-generation technology enabled games to grow in length and scope. They moved from arcade-like short play sessions to longer, more involved experiences. As a result, many designers created methods for players to save their games when

ROM cartridges afforded no storage. Password-based saves, with elaborate passwords consisting of letters, numbers, and symbols, were used to reflect game states, including progress, lives, player items, and statistics. With the inclusion of RAM chips and batteries in cartridges, some games could keep data stored in RAM even when the system was off. *The Legend of Zelda* (1986) and *Dragon Warrior* (1989) used this kind of battery save to record players' progress on their lengthy journeys.

Other systems of the third generation included the SEGA Master System released in 1985 and the Atari 7800 in 1986.

FOURTH GENERATION (1987–99)

Commonly known as the 16-bit era, the fourth generation of consoles is remembered by the heated competition between Nintendo and SEGA company mascots Mario and Sonic. Improvements in central processors and distinct memory for audio and video created platforms for faster, more colorful, and more ambitious games. Both the Super Nintendo Entertainment System (SNES) and SEGA Genesis used true 16-bit processors, whereas the NEC PC-Engine/TurboGrafx-16 was actually a hybrid of an 8-bit CPU and 16-bit video display controller. Vibrant colors continued to be important to graphical quality, and differences in the palettes of each console gave them their distinct looks. The Genesis and TurboGrafx-16 each had 512-color palettes, although the Genesis could only display 61 colors on-screen, compared with the 482 colors the TurboGrafx-16 could display at once. The SNES, on the other hand, could display 256 colors at once but had more than 32,000 colors to choose from.

The increased processing and graphical power meant that games of the 16-bit era could simultaneously display more objects, employ larger sprites, and perform parallax scrolling. The picture processing unit (PPU) of the SNES, for example, was able to produce one of eight kinds of backgrounds that varied in their number of layers, color palettes, scrolling, rotation, and transformation. The most famous of these was Mode 7, which translated and rotated the background, often laying it down as if it were a ground surface with a vanishing point to give the illusion of z-axis depth and a camera perspective.

FIFTH GENERATION (1993–2002)

The fifth generation of consoles was perhaps the most diverse in terms of hardware technology. Processors ranged from 16-bit to 64-bit; some consoles continued to use game cartridges, but others had moved to CD-ROMs. Dedicated CD-ROM-based consoles were introduced first in Japan in 1991 with the FM Towns Marty and then in North America in 1993 with the 32-bit 3DO Interactive Multiplayer manufactured by Panasonic. The Atari Jaguar, which continued to use cartridges, was technically a 16-bit system, but like the TurboGrafx-16, it was beefed up with powerful 32-bit graphics processors and CD-quality sound chip (Kent 2001, 488).

The next three consoles of the generation moved home consoles into filled-polygon graphics, which enabled true three-dimensional worlds, although many games continued to employ sprites and prerendered environments. The SEGA Saturn featured two 32-bit processors, while the Sony PlayStation's single 32-bit main CPU also acted as its three-dimensional graphics renderer. Both consoles also read their games from CD-ROMs. Nintendo, on the other hand, chose to stay with cartridges with its 64-bit Nintendo 64. The immediate benefit was quick load times, but cartridges were expensive to manufacture and could not hold nearly as much data as a CD-ROM (Kent 2001, 511). Nintendo also chose to deviate from industry trends with its unique analog controller, and the four controller ports in the system set it apart as a multiplayer favorite.

SIXTH GENERATION (1998–2004)

The sixth generation made great strides in processing and graphics power, although increasing hardware complexities made it more difficult to compare numbers between systems. Instead, features such as online play and the utility of the hardware as a media player became the distinguishing features of the consoles.

In May 1998, SEGA announced the SEGA Dreamcast, a 128-bit console with a three-dimensional graphics chip, Windows CE, a 56K modem, and a proprietary disc format called GD-ROM. It launched in Japan in November 1998 and almost a year later in North America. The Sony PlayStation 2 launched in Japan in March 2000 and in North America in October. Beyond its processing, graphical, and audio upgrades, the hardware featured an expansion slot to add an Ethernet modem or hard drive, was backward compatible with original PlayStation games, and used DVDs for its software (its DVD player was an early selling point). Whereas all the other consoles of the generation had four controller ports, the PlayStation 2 only had two.

The Nintendo GameCube launched in Japan in September 2001 and two months later in North America. Its CPU was based on IBM's PowerPC architecture and a GPU from longtime PC graphics card producer ATI. Like the PlayStation 2 and the Microsoft Xbox, the hardware had internet capability, although no centralized service for online play meant relatively few games took advantage of the feature. Instead, local four-player games such as *Super Smash Bros. Melée* (2001) became immensely popular. Nintendo also experimented with connectivity between its Game Boy Advance and the GameCube, using the handheld as a controller and secondary screen for games such as *Final Fantasy: Crystal Chronicles* (2003), *Pac-Man v.* (2003), and *The Legend of Zelda: Four Swords Adventures* (2004).

The American entrant of the generation was the Microsoft Xbox, which launched in North America in November 2001. Having provided a platform for PC gaming for more than a decade, Microsoft conceived the Xbox as a console that took advantage of the best that PC gaming offered without worrying about supporting multiple possible hardware configurations (Takahashi 2002, 9). Based on Microsoft's PC technology DirectX, the Xbox used an Intel Pentium III processor and a video card codeveloped with Nvidia. As the gap between the performance capabilities of the different consoles closed, features and services grew more important. Predicting this, Microsoft designed the hardware with a built-in hard drive to replace memory cards and an Ethernet port. The Xbox's most popular launch title was *Halo: Combat Evolved* (2001), but it was not until the release of *Halo 2* (2004) that Microsoft launched its centralized online Xbox Live play service.

A lesser-known console, and one of the last of the sixth generation, was the first motion-controlled console, the XaviXPORT, which was released in 2004. It used wireless controllers shaped like sports equipment, an idea that would be popularized with the seventh-generation Nintendo Wii.

SEVENTH GENERATION (2005–13)

The seventh generation began with two divergent approaches that have converged over time. Both Microsoft and Sony released improved hardware with high-definition graphics and focused on the online social and multiplayer capabilities of their services. Nintendo, on the other hand, charted a different route with its wireless motion-based controllers, a lead that Microsoft and Sony soon followed. All three seventh-generation consoles had online stores for downloading new and old games and featured apps for streaming video. Microsoft's and Sony's consoles also offered additional services for buying music and movies.

The first company to move into the seventh generation was the last to enter the previous generation. The turnover was quick for Microsoft, which had launched its first console only four years earlier, but the first-to-market move was a strategic play to establish its updated Xbox Live service. The Microsoft Xbox 360 saw numerous hardware feature configurations after its launch in November 2005, including additional storage, built-in Wi-Fi, and the shrinking the physical form factor of the hardware. In November 2010, Microsoft released the Kinect add-on, which was a controller-free interface that used the player's body as a gestural interface for specifically designed Kinect games and, optionally, system menu navigation.

The Sony PlayStation 3 appeared in November 2006 in Japan and North America. It used Sony's Blu-ray Discs for games and could also play Blu-ray movies, DVDs, and CDs. Like the Xbox 360, the console was available in multiple hardware configurations at different prices and used an account-based online service called PlayStation Network. In 2008, the console's firmware was updated to allow games and movies to use stereoscopic 3-D technology on compatible 3-D displays. Sony's handheld motion controller, called PlayStation Move, used the PlayStation Eye camera to track the motion of an illuminated sphere on the end of a wand-shaped controller and was released in September 2010.

Motion-based controllers were used by the Nintendo Wii, which was released in November 2006. Rather than upgrading its hardware to compete with the Xbox 360 or PlayStation 3, Nintendo chose to focus on building a different kind of game system to distinguish itself in the market. The Wii's motion-based controller consisted of two parts. The primary controller was a remote (known colloquially as the "Wiimote") that used accelerometers and an infrared sensor interfacing with a sensor bar to track movement in space. The second, called the Nunchuk, was an analog stick with an accelerometer and two trigger buttons that connected with a cord into the remote. *Wii Sports* (2006), which was included with the console, served as a proof of concept for motion control in its bowling, golf, baseball, and boxing minigames. The remote could also be held sideways like the original NES controller for classic games released at the Wii Shop, and Nintendo offered an additional controller compatible with its offering of emulated games from later generations. Instead of a hard drive, the Wii used internal flash storage and also accepted SD memory cards to expand storage and was limited to 480p video resolution. The console was backward compatible with GameCube games and featured four controller ports for the previous console hidden under a panel. Nintendo chose not to use a centralized service for online play for the Wii, opting instead to have players share “Friend Codes” on a game-by-game basis.

The extended duration of the seventh generation of consoles was a product of multiple factors. The enormous success of the Nintendo Wii, which sold over one hundred million units, prompted competition between the three major console manufacturers. The powerful hardware in the Xbox 360 and PlayStation 3 did not cause the graphics plateau that is often a motivating force in technological improvement. The online services of these consoles created new, consistent sources of revenue for the console manufacturers, downloadable software updates allowed the manufacturers to keep improving their operating systems, and the release of new peripherals negated the need for all-new hardware.

EIGHTH GENERATION (2013–)

The eighth generation of consoles began with Nintendo’s Wii U, which bridged the previous generation. Announced at the Electronic Entertainment Expo in 2011 and released for sale globally in fall 2012, the Wii U sought to capitalize on the popularity of the Wii by enabling backward compatibility with the Wii controllers and software while offering a new play experience: a handheld tablet controller with a touchscreen connected wirelessly to a base station that housed the computing power, disc drive, Wii sensor bar port, and an HDMI connection to a television; the base station could also wirelessly transmit video. Reminiscent of Nintendo’s earlier experiments in which the Game Boy Advance could function as a controller for select GameCube games, the console offered the possibility for game developers to design around the affordances of a second screen. Many games for the console could be played solely on the tablet controller when in range of the base station. The system software offered digital downloads of both new and classic games, a unified “friends” system for social networking, and the MiiVerse network in which players could share screenshots, messages, and drawings for specific games, such as *Splatoon* (2015) and *Super Mario Maker* (2015). Among lagging sales and software support from third parties, the system’s life span came to an end with the release of the Nintendo Switch in 2017.

The Nintendo Switch—in which the concept of the Wii U converged with the company’s handheld expertise—was officially unveiled in 2016 and launched in March 2017. The Switch hardware is primarily housed within its handheld touchscreen body for portable play, but it can also be connected to a dock to display on a television using a separate controller. In support of this design, the handheld portion of the Switch has controllers built into its body that can be detached so that the screen can be docked while the controllers are used separately. These Joy-Con controllers retained some of the gyroscopic motion control of the Wii and can also be turned to a sideways orientation, with fewer buttons, for use in two-player games. The Switch notably launched with *The Legend of Zelda: Breath of the Wild* (2017) and soon saw major releases in Nintendo's franchises, such as *Super Mario Odyssey* (2017), *Splatoon 2* (2019), *Super Smash Bros. Ultimate* (2018), and *Animal Crossing* (2019). Indie games have also found success on the platform's digital game store.

Microsoft and Sony initially brought different approaches to the eighth generation of consoles to differentiate their similar AMD-based, x86 architecture internal hardware. During E3 2013, Microsoft pitched the Xbox One as a primarily digital platform, moving away from a physical retail marketplace in favor of game downloads and onetime install discs. Negative consumer responses to Microsoft's plans for digital rights management and software sharing, however, caused Microsoft to reconsider its strategy, and when the hardware launched in November 2013, it took the traditional physical/digital hybrid approach to game sales. The Xbox One was also designed around a new version of the motion-tracking and voice-activated Kinect as an integral part of the system's interface, though this option became less popular over time. Four years into the console's life cycle, Microsoft announced a hardware revision called the Xbox One X that updated the internal components (including a faster CPU, GPU, and 4K resolution output). This "half-step" upgrade was designed so that games would be compatible with all Xbox One hardware versions without creating a break in generations.

Much like the seventh generation, software and services were a significant part of the console's development. During the Xbox One era, Microsoft continued to push digital games sales and began a subscription service called Xbox Game Pass; users could pay a monthly fee for access to an expansive library of new and old games. The company worked throughout the generation to make older games backward compatible with the new system—a feature in which its competitor Sony did not excel. Microsoft also made efforts during this time to reduce barriers between its first-party games on Windows software and the dedicated Xbox hardware, bridging a divide that had long persisted in the company's corporate structure. This effort included games that could be purchased to work on both platforms and the ability to stream gameplay from the Xbox One to a local Windows 10 computer.

Sony's approach to its PlayStation 4 console, which also launched in 2014, followed the precedent established by the PlayStation 3: games on discs, a digital storefront, the PlayStation+ subscription service, and a motion-tracking camera called the PlayStation 4 Eye. Noting the success of Xbox Live Arcade and indie games released on Steam, Sony worked to court small studios in addition to the major developers and publishers traditionally associated with game consoles. During this period, Sony developed the PlayStation Now service that used the Gaikai cloud technology the company had acquired to stream games to players (rather than downloading the games locally). Through this method, Sony was able to make certain PlayStation 2 and 3 games backward compatible because it did not need to run them on the console's hardware. Sony also worked to expand its

Remote Play function (originally designed to stream PS3 games to the Vita on the local network) so that PS4 games could be played outside of the home on a laptop or tablet.

In 2016, Sony released a new peripheral for its console: PlayStation VR, the only console-based headset of the generation to capitalize on the virtual reality (VR) successes of the Oculus Rift and HTC Vive. The 5.7 OLED head-mounted display worked in conjunction with the PlayStation 4 Camera and the DualShock 4 (which featured an illuminated bar on the top of the controller for motion tracking), and it could make use of the PlayStation Move controllers released for the PS3. Notable PSVR games included the console exclusives *Astro Bot Rescue Mission* (2018) and *Resident Evil 7 Biohazard* (2017).

Bobby Schweizer

See also: Console-Based Games

Further Reading

Amos, Evan. *The Game Console: A Photographic History from Atari to Xbox*. San Francisco, CA: No Starch Press, 2019.

DeMaria, Rusel, and Johnny L. Wilson. *High Score: The Illustrated History of Electronic Games*. Berkeley, CA: McGraw-Hill/Osborne, 2002.

Donovan, Tristan. *Replay: The History of Videogames*. East Sussex, UK: Yellow Ant, 2010.

Kent, Steven. *The Ultimate History of Video Games: From Pong to Pokémon and Beyond*. Roseville, CA: Prima Publishing, 2001.

Monfort, Nick, and Ian Bogost. *Racing the Beam: The Atari Video Computer System*. Cambridge, MA: The MIT Press, 2009.

Sheff, David. *Game Over: Press Start to Continue*. Wilton, CT: GamePress, 1999.

Takahashi, Dean. *Opening the Xbox: Inside Microsoft's Plan to Unleash an Entertainment Revolution*. Roseville, CA: Prima Publishing, 2002.

Genesis. *See* SEGA Genesis/SEGA Mega Drive

Germany

Germany is home to one of the main predecessors of computer games. In the late eighteenth and early nineteenth centuries, the "war game" (Kriegsspiel) was developed by Johann Chr. L. Hellwig, Georg Leopold von Reisswitz, and his son Georg Heinrich von Reisswitz. It was the first complex simulation of strategic battles that included mechanics that are still defining for any modern strategy game. A "computer" at the time was a human calculator who literally computed the results of actions undertaken by the "players," who were military generals wanting to estimate the outcomes of different strategies in battle.

The use of electronic computer technology for gaming started in 1951 at the international trade fair Internationale Funkaustellung (IFA) in Berlin. To demonstrate the value of the first electronic computer in Germany, the Nimrod (developed by Ferranti from England), the game nim was presented to high-profile politicians such as the minister of economic affairs, Ludwig Erhard, and the federal chancellor, Konrad Adenauer.

In Germany's games economy, in regard to commerce and production, imports still heavily dominate over exports. During the rise of video games in the 1970s, public skepticism was high, and the medium as a whole was widely rejected as dangerous for the healthy education of the youth. In 1985, the "law for protection of the youth" was updated, and arcade games were banned from public spaces open to the youth, putting them into the same realm as one-armed bandits and other gambling machines. Also, the Bundesprüfstelle für jugendgefährdende Schriften (Federal Department for Media Harmful to Young Persons) started policing games more and more. The first game banned was the Atari VCS 2600 game *River Raid* (1982) because of its military content.

Since then, video game research and education in Germany has diversified into various branches, with empirical studies and quantitative research on one hand and fundamental/philosophical studies and qualitative research on the other. Cultural research first started as journalism, and the work of Florian Rötzer, Konrad Lischka, and Mathias Mertens had an influence on video game studies in the early 2000s. Game studies in particular had its origin in the Arbeitsgemeinschaft Games (Game Studies Group), a chapter of the Gesellschaft für Medienwissenschaft (Society for Media Studies), founded in 2000 by Britta Neitzel and Rolf Nohr. Today, the Digital Games Research Center (DIGAREC) of the University of Potsdam and the Game Lab Cologne (GLC) are major centers in the field. Private schools such as the Games Academy (Berlin, Frankfurt/Main), the UE Germany (Berlin), the Mediadesign Hochschule (Berlin, Dusseldorf, Munich), and the SAE Institute (Berlin, Cologne, Munich) have also established training programs.

Video game players wearing virtual reality headsets at the IAA International Motor Show Auto Exhibition in Frankfurt, Germany, in September of 2019. (Uladzimir Starazhenka/ Dreamstime.com)

In 1994, the Unterhaltungssoftware Selbstkontrolle (USK; Self-Monitoring of Entertainment Software) rating system was developed, one of the most restrictive youth protection systems in the world. Since 2008, the USK has been administered by the industry. A milestone in the cultural debate was the declaration of video games as cultural—and potentially artistic—artifacts, which was announced in 2007 by the CEO of the Deutscher Kulturrat (German Culture Board), Olaf Zimmermann. Also, several federal governments institutionalized game content support programs. These mainly come in the form of funding for prototypes from the regional media funds of Baden-Württemberg, Bavaria, Hamburg, and North-Rhine Westphalia. Berlin-Brandenburg, Saxony, Saxony-Anhalt, and Thuringia have joint programs. Another unique institute in Germany is the cultural games foundation (Stiftung Digitale Spielekultur), which was founded in 2012 in Berlin by the industry associations GAME and BIU. It organizes events and publishes brochures on digital games as cultural medium.

Within the framework of these public support programs, a unique German institution could open its doors again; the Computerspielemuseum (Computer Game Museum) in Berlin was founded in 1997 but had to close its public exhibitions five years later because of financial cuts. Its former director, Andreas Lange, opened a permanent exhibition on the culture and history of video games in 2011 with an extensive collection of early video game software and hardware as well as game magazines and art installations. More recently, the Computerspielemuseum, the USK, and DIGAREC have joined forces with the Stiftung Digitale Spielekultur to establish the world's largest computer games collection. Germany is also host of the largest video game fair, Gamescom, in Cologne. The fair ran under the name Games Convention in Leipzig from 2002 until 2008. The eSports League (ESL) is one of the biggest esports organizations in the world and was founded in Cologne by Turtle Entertainment in 2009.

Typical German games—in the sense that the genre is either more popular in Germany than in other countries or that the games are produced in Germany—are strategy games such as the *Anno* series or the *Settlers* series from Blue Byte Studios (not to be confused with another very typical German game, *The Settlers of Catan* [1995], which is a board game by Klaus Teuber); soccer manager titles such as the *Bundesliga Manager* series or Ascaron's *Anstoss* series; and simulation games, which include dredge simulators, train simulators, subway simulators, farm simulators, and even road sweeper simulators (Astragon is an active publisher in this genre). Fantasy role-playing games (RPGs) are also popular, such as Piranha Bytes' *Gothic* series, Attic's *Das Schwarze Auge* series, and Radon Labs' *Drakensang* series. The best-known German action games are probably Rainbow Arts' *Turrican* (1989) and *The Great Giana Sisters* (1997), both programmed by Manfred Trenz. For years, the economically most successful game published in Germany has been from the *FIFA* series by Electronic Arts (EA).

Although video game imports dominate over indigenous production and exports, with a total revenue of EUR 4.367 billion in 2018 (Game Verband der deutschen Games-Branche [Association of the German Games Industry] 2019), the consumption is the third largest in Europe, after the United Kingdom and France. Hence, every international publisher—Nintendo, Sony, SEGA, EA, Ubisoft, Take 2, and Vivendi—has an office in Germany. CDV (established in 1989 and insolvent in 2010) and Frogster Interactive Pictures (FIP; established in 2005 and taken over by Gameforge in 2010) are game publishers with a German origin, but neither focuses on triple-A console titles. Along with Handy Games (established in 2000 in Bamberg and taken over by THQ Nordic in 2018), Headup Games (established in 2009 in Düren), Deck13 Games (launched in 2014 in Frankfurt), and Daedelic Entertainment (established in 2007 in Hamburg), there are several smaller indie game publishers based in Germany.

Today, Crytek (established in 1999) is the biggest triple-A developer in Germany. The internationally lesser known Blue Byte (established in 1988 and part of Ubisoft since 2001) has a longer tradition; its most successful games include *Battle Isle* (1991), *The Settlers* series (1993–), and the *Anno* series (2009–). Yager (established in 1999) received a contract to develop *SPEC OPS: The Line* (forthcoming) for the international publisher Take 2 and has hence become one of the big studios. Another successful branch of German developers are so-called browser games, which do not need a client to be installed and run entirely through standard web browsers, such as Firefox, Safari, Netscape, and Internet Explorer. Registration is free, but by paying micro amounts that may start at one cent, constructions or other tasks are sped up, making gameplay faster for players willing to invest. Companies such as Bigpoint (established in 2003 as M.wire and renamed Bigpoint in 2007), Gameforge (established in 2003), Wooga (established in 2009), and several more are new but potent players on the international browser game and social media game market. Today, most of the browser game developers also focus on mobile games. Internationally successful companies such as Kolibri Games (founded in 2016 as Fluffy Fairy Games) belong to the fastest-growing companies in Germany.

Other companies are successful in the online casual games market, such as GameDuell with www.gameduell.de (established in 2003) and Intenium with www.deutschland-spielt.de (established in 2003). Because of the current structure of the German full-price market, services such as localization (every video game published in Germany is translated into German and, in certain cases, is adapted according to the youth protection system or other cultural aspects), online payment systems, community management, and distribution play a major role. Since 2018, publishers and developers are represented by one central association, the Association of the German Games Industry (Game Verband der deutschen Games-Branche). Before that, developers were represented by G.A.M.E. and publishers by BIU.

Germany is known for a vibrant demoscene, continuing the tradition of code-efficient skill demonstrations. Evoke has taken place regularly in Cologne since 1997 and is still one of the biggest demo meetings worldwide. Prominent organizations in the field of game art and game culture are the A MAZE. festival (established 2008), the Computerspielemuseum (Computer Games Museum) in Berlin, the Videospielkultur (VSK) in Munich (established in 2006), the ZKM in Karlsruhe (with programs since 2009), and the Next Level Conference in Cologne (since 2010).

Regarding gaming hardware, Germany does not have a history or market structure significantly different from the rest of Western Europe. In the 1970s, the market was flooded with *PONG* (1972) clones (called *Telespiel* for “Television Game”). Later, the Atari VCS 2600, Nintendo Entertainment System (NES), Super Nintendo Entertainment System (SNES), SEGA Mega Drive, and the Sony PlayStation were as dominant as they were in the United States. Yet, with the rise of Commodore computers (the Commodore 64 [1982] in particular), and IBM-compatible systems (using the Intel 80286 processor of 1984), the games market mainly shifted toward PC-based games. This market sector is still relatively strong in Germany, although in recent years, with the introduction of the Microsoft Xbox, the Nintendo Switch, and the Sony PlayStation, console-based games have gained more market share; total revenue for consoles and hardware in 2018 was EUR 938 million (Game Verband der deutschen Games-Branche 2019). As a comparison, the mobile games software sector made a revenue of EUR 497 million through apps and in-game purchases (Game Verband der deutschen Games-Branche 2019).

During the arcade game and home console boom of the 1970s and 1980s, a truly exotic piece of video game hardware was created in East Germany (the socialist German Democratic Republic [GDR]). To foster an interest in microelectronics in the youth and society, the BSS01 (Bildschirmspiel 01, “Screen Game No. 1”) was developed in the Halbleiterwerk Frankfurt-Oder in 1980, based on the AY-3-8500 *PONG* chip made by General Instruments. By Western standards, it was yet another *PONG* clone, but in East Germany, the four integrated games (*Tennis*, *Pelota*, *Squash*, and *Soccer*) marked a revolution in microelectronics. Because of the very high price of 500 marks (at the time about the same amount as a standard monthly salary), the console was mainly set up in public youth centers (*Jugendfreizeit Zentren*), where it, in contrast to the public bans undertaken in the West, was integrated into the general educational strategy.

The GDR also developed its own arcade machine called *Poly Play* (1985), with up to eight integrated games, but it never reached the standards in quality the youth were used to from illegal and half-legal imported games from West Germany.

Michael Liebe and Stephan Günzel

See also: Digital Games Research Center

Further Reading

Game Verband der deutschen Games-Branche website. 2019. Accessed September 16, 2020. Available at www.game.de.

Lischka, Konrad. *Spielplatz Computer: Kultur, Geschichte und Ästhetik des Computerspiels*. Hannover, Germany: Heise, 2002.

Pias, Claus. *Computer Spiel Welten*. Munich, Germany: Sequentia, 1993.

Rötzer, Florian, ed. *Virtuelle Welten—Reale Gewalt*. Hannover, Germany: Heise, 2003.

Schröder, Jens. *Auferstanden aus Platinen: Die Kulturgeschichte der Computer- und Videospiele unter Besonderer Berücksichtigung der Ehemaligen DDR*. Stuttgart, Germany: Ibidem-Verlag, 2010.

Zimmermann, Olaf, Theo Geißler, and Gabriele Schulz, eds. *Streitfall Computerspiele: Computerspiele Zwischen Kultureller Bildung, Kunstfreiheit und Jugendschutz*. Berlin, Germany: Deutscher Kulturrat, 2007.

Gestural Interfaces

Gestural interfaces, or motion controllers, are video game and computer peripherals that translate a variety of human movements, such as finger taps, arm swings, and head tilts, into on-screen action. By the broadest definition of *gesture*, “actions that have the features of manifest deliberate expressiveness” (Kendon 2004, 15), nearly all physical interfaces, such as the click-and-drag functions of the gamepad, mouse, touchscreen, and touchpad, are considered gestural. Such interfaces often afford or enable mimetic repurposing of already existing biomechanical actions and their possible meanings, from swinging the arm like a tennis forehand to dismissing an idea (or a person) with a swipe of the hand. In the past decade, gestural interfaces targeting the hand and fingers have especially proliferated with the advent of smartphones and tablets and the rise of touchscreen games.

Technologically, gestural interfaces combine various hardware devices, such as accelerometers, cameras, and touch sensors, which can communicate player speed, position, and force to the computer. The resulting motions or gestures are often evocative of those used in other nondigital activities, although usually simplified, enhanced, and abstracted. Thus, the Nintendo Wii tennis player or *Rock Band* (2007) guitarist, for example, may simulate the experience of hitting a forehand or jamming with the band not only within the space of the screen but also within the posture and movement of the body. The Nintendo Wii console and the Wiimote controller, introduced in 2006, have rekindled industrial and theoretical interest in developing new interfaces and understanding their consequences for interface design, video gaming, and the culture at large.

ORIGINS OF HUMAN-MACHINE INTERFACES

Scholars have traced the origins of human-computer interfaces back to the increased mechanization of work and play during the late nineteenth and early twentieth centuries. Assembly-line production drove the study of human biomechanics in the name of efficiency, perversely adapting the human to the machine instead of the reverse.

In their spare time, workers increasingly turned to a variety of recreational machines, including the phonograph, the one-armed bandit gambling device, and various coin-operated precursors of the film projector, such as the mutoscope and the kinetoscope. The bar or saloon, the midway, and eventually the penny arcade became settings for playing with machines, the pleasure of which seemed to derive from both their seemingly autonomous function and their responsiveness to human input. Many coin-op games were derived from activities of the farm and field (already nostalgic in an era of increasing urbanization), such as strength tests reminiscent of wielding an ax, mechanized duck hunting in shooting galleries, or arm wrestling mechanical strongmen.

The most common antecedent to video arcade games, however, is pinball, a modernization of Bagatelle, a billiards-style game. The first pinball-style game, *Baffle Ball*, was introduced in 1931. It was not until after World War II, however, that the pinball flipper made its debut, cementing the effectiveness of pressing a button as a means of skillful real-time interactive play. The agility, force, and speed of the human finger to tap or press—in effect, one of the body's smallest, most efficient, and precise gestures—became the basis for machine and computer interactivity, from the keyboard to the gamepad.

VIDEO GAMES AND THEIR INTERFACES

Video games emerged from the lab in the early 1970s in two guises: as television-based entertainment in the home and as the newest generation of coin-op amusements in the arcade. New video game companies, most notably Atari, joined old pinball manufacturers in leading the development of video games, introducing consumers to a variety of knobs, buttons, levers, and other interface controls for predominately ball-and-paddle games. However, game-specific interfaces quickly emerged, including steering wheels for driving games and racing games, such as Atari's *Gran Trak 10* (1974)—which included pedals and gear shift—and various types of guns for shooting games, such as SEGA's *Bullet Mark* (1975) and *Balloon Gun* (1975). Various sit-in games altered the posture of the player, suggesting a cockpit experience akin to driving a car or flying an airplane. Such interfaces traded on both familiarity and novelty for their appeal because the skills and experience of everyday driving, for example, could now be emulated—and amplified—in a race car simulation.

Guns and steering wheels were common gestural interfaces for early home video game consoles as well. The first home console, the Magnavox Odyssey (1972), featured a light gun peripheral, and the Coleco Telstar Arcade (1977) included a steering wheel, which was built into the standard console along with a pistol grip and the usual knob controllers. Control sticks—joysticks molded to fit the grip of the hand and often crowned with a button or trigger—also became a popular peripheral for playing video games such as Microsoft's *Flight Simulator* (1982) on personal computers. However, most console manufacturers were more concerned with developing interfaces that were compatible with many games, as increasing market share depended on a steady stream of new titles that would work with existing hardware. Although the Atari VCS 2600 (1977) joystick became the icon of video game interactivity, it was Nintendo's development of the "plus" button (1982), better known as the direction pad (or D-pad), that would standardize handheld and console controllers for movements of the thumb.

Manufacturers continued to experiment with guns (such as Nintendo's Zapper), steering wheels, pressure pads, and other devices in the 1980s, but few devices caught on with the public. One notable failure that anticipates contemporary gestural interface design was Mattel's Power Glove of 1989, a peripheral worn on the hand and equipped with a gamepad-like interface at the wrist. Designed for the popular Nintendo Entertainment System (NES), the Power Glove nevertheless received little software support and later was best remembered as a prop in the 1989 film *The Wizard* ("I love the Power Glove. It's so bad."). Although the glove failed to catch on, it did prove the technological viability of hands-free gestural interfaces for video gaming.

As the home became the predominant site for video game play, arcade game manufacturers responded in the 1990s with higher-resolution graphics and elaborate novelty interfaces to attract customers. Cockpits, skateboards, soccer balls, boxing gloves, fishing poles, motorcycles, jet skis, and many other game-specific interfaces—some reminiscent of carnival and boardwalk games from a century before—crowded into the decreasing number of arcades. One genre that debuted in the arcade and migrated to the home was music/rhythm-and-dance games. Konami's *Dance Dance Revolution* (1998) had players dancing on a pressure-sensitive floor in time with audiovisual cues on-screen; the game became an international phenomenon and was adapted for home use, with a dance mat peripheral, in 2001. Less well-known but prescient games such as *Guitar Hero* (2005) and *Rock Band* (2007) were musical instrument games, including Konami's *GuitarFreaks* (1998) and *DrumMania* (1999), which used prop instruments to enhance the physical experience of playing like a rock star.

Early interface developments anticipated the later split in gestural interface design between single-use or prop-like interfaces with specific form factors, such as those found in musical instrument–based games, and interfaces that are minimal in appearance but offer a wide range of motion-sensitive control. In the latter category, the Nintendo Wii, which debuted in 2006, has spurred widespread consumer interest in motion-control interfaces, thanks to the console's motion-sensitive Wiimote controller. The Wiimote, followed by the *Wii Fit* (2007) balance board, has been effective in reclaiming the home as the setting for casual and social video games by combining intuitive interface design with familiar sports titles. In doing so, Nintendo has compelled hardcore game console manufacturers

Sony and Microsoft to develop their own gestural interfaces, the Move and the Kinect, respectively. In some cases, gestural interfaces have become transparent, disappearing into a touch-sensitive and motion-sensitive screen, as is the case with the iPhone and the latest generations of mobile devices. For the Microsoft Kinect, the interface shifts to the body itself, as a camera and other sensors are designed to respond to full-body motion and voice commands in a hands-free fashion, with gestures for pointing and selecting replacing button functionality.

IMPLICATIONS OF INTERFACE DESIGN ON INTERACTIVITY

Designing for computer and video game interactivity takes into account both software and hardware concerns, as objects on-screen must respond to physical input in ways that require only minimal adaptation by the user. An early principle of interface design known as Fitts's law formulates a mathematical model for relating movements of the hand to the size and distance of an intended target. The model has proved useful in the design of many interface elements, such as the movement of a mouse in relation to the size of folder icons on the screen. Additionally, the principle of affordance also comes into play. Psychologist James J. Gibson first advanced the concept of *affordances*, or the perceived possibilities for action that an object may present in a given context or environment (e.g., a chair in a room "affords" sitting). For video game controllers, affordance suggests a consideration of not only the device's physical construction (such as buttons for pushing) but also the actions it enables in the screen-based environment to which it connects the user. The resulting correlation between player action and screen result can be highly representational, such as the upward push of a thumbstick to move forward on-screen. Most video game interfaces are predicated on a maximal result for minimal effort (e.g., carjacking in *Grand Theft Auto IV* (2008) requires only the press of a button), but gestural interfaces invite a closer relationship between biomechanical action and on-screen result. In the presence of an avatar, gestural interfaces can afford highly literal motions in a nearly one-to-one relationship between the player's character and his or her own body.

Although the pursuit of fidelity between body and character movement—a concept known as *motor isomorphism*—promises to expand the possibilities of interface design and interactive experience, the implications of increased biomechanical involvement in video game play requires further research and theorization. Gestural interfaces alter the space of play and the role of the body, shifting the focal point of interactivity from a predominantly screen-based environment to a more hybrid relationship between digital and physical bodies and spaces; for example, while playing tennis on *Wii Sports* (2006), physical bodies may move into optimal spatial position to hit a purely digital ball. Scholars have observed that gestural interfaces may raise problems of perception: even though the body is more active with gestural interfaces, feedback to the body remains relatively mute, as only the standard audiovisual cues convey whether a forehand swing results in a hit or a miss.

Some interface designers contend that the rush toward gestural interfaces fosters bad design, such as touchscreens prone to accidental inputs, inconsistent gestural interface standards, and even hand positioning that blocks the screen from view. Additionally, the physiological benefits of gestural interfaces remain unclear, as overuse injuries may undercut fitness claims made by Nintendo and other manufacturers (see Health [Physical]). Nevertheless, the growing pains of gestural interfaces appear to be offset by the interactive pleasures such devices offer.

POSSIBLE DIRECTIONS FOR GESTURAL INTERFACES

The current state of gestural interface suggests future design efforts may diverge along three paths, depending on whether the player is positioned in front of, in contact with, or "inside" of the screen. A future vision of gestural interface writ large in front of giant displays, as depicted in films such as *Minority Report* (2002) and *Iron Man 2* (2010), is perhaps now less assured for gaming, as Nintendo, Microsoft, and Sony have slowed or abandoned their conventional gestural interfaces in recent years. Handheld touchscreens, however, are thriving, with original game titles and adaptations from PCs and consoles extending the reach of touchscreen games to include nearly every genre and style of play. Artists and hobbyists are also exploring gestural interfaces by taking advantage of relatively inexpensive accelerometers and infrared sensors to create new play experiences. Hardware modding of Wiimotes, touchscreens, and other manufactured gestural controllers is yielding novel interfaces for use with indie and conventional games as well as providing unprecedented access to gaming for players with physical limitations (see **Accessibility**). Customizable gestural interfaces may ultimately move from the fringe to the mainstream and prove a viable mass production alternative to one-size-fits-all configurations.

For technology companies, the next gestural interface frontier is playing "inside" the screens of virtual, augmented, and mixed reality. The promise of virtual reality (VR), or the notion of digital simulation that completely envelops the user (like the holodeck in the *Star Trek* television franchise), may represent the theoretical endpoint at which mimetic gestures become the actual movement itself. For example, VR headsets such as Oculus Rift, PlayStation VR, Samsung Gear, and others depend on a 1:1 relationship between head movements and virtual "looking" for both aesthetic and practical reasons (simulation sickness often results from mismatches between literal head movements and virtual looking). Early VR game titles such as *Beat Saber* (2018) and *Racket: NX* (2018) enable swinging arm movements not unlike Wii games from a decade ago, but now those movements are precisely tracked by sensors and motion cameras for virtual representation. Developers of haptic and motion-control systems for VR are moving beyond head and hand tracking to bring the rest of the body into the screen, following up on gestural interface ideas first explored by digital media artist Myron Krueger and his *Videoplace* "responsive environment" project in the 1970s.

For all its advances, gestural interface technology continues to pursue ideas about interaction and immersion based on the first interface living beings learn to use: their own bodies.

David O'Grady

See also: Affordances; Interface; Touchscreen Games

Further Reading

Gregersen, Andreas, and Torben Grodal. "Embodiment and Interface." In *The Video Game Theory Reader 2,* edited by Bernard Perron and Mark J. P. Wolf, 65–83. New York: Routledge, 2008.

Hack-a-Wii website. Accessed September 16, 2020. Available at http://hackawii.com.

Huhtamo, Erkki. "What's Victoria Got to Do with It? Toward an Archaeology of Domestic Video Gaming." In *Before the Crash: Early Video Game History*, edited by Mark J. P. Wolf, 30–52. Detroit, MI: Wayne State University Press, 2012.

Interactions magazine website. Accessed September 16, 2020. Available at http://interactions.acm.org/index.php.

Juul, Jesper. *A Casual Revolution: Reinventing Video Games and Their Players*. Cambridge, MA: MIT Press, 2010.

Kendon, Adam. *Gesture: Visible Action as Utterance.* Cambridge, UK: Cambridge University Press, 2004.

Krueger, Myron W. *Artificial Reality*. Boston, MA: Addison-Wesley, 1983.

Noble, Joshua. *Programming Interactivity: A Designer's Guide to Processing, Arduino, and openFrameworks*, Sebastopol, CA: O'Reilly Media, 2009.

Nova, Nicolas, Katherine Miyake, Walton Chiu, and Nancy Kwon. *Curious Rituals: Gestural Interaction in the Digital Everyday*. Pasadena, CA: Art Center College of Design, 2012. Available at https://curiousrituals.files.wordpress.com/2012/09/curiousrituals-book.pdf.

O'Grady, David. "NES D-Pad: Interface." In *How to Play Video Games*, edited by Matthew Thomas Payne and Nina Huntemann, 269–276. New York: NYU Press, 2019.

Shneiderman, Ben. *Designing the User Interface: Strategies for Effective Human-Computer Interaction*. New York: Addison-Wesley, 2005.

Wolf, Mark J. P., ed. *The Video Game Explosion: A History from PONG to PlayStation and Beyond*. Westport, CT: Greenwood Press, 2007.

Girls' Games

The idea of "girl games" arose in the late 1990s after the video game market had been firmly reestablished in North America, starting with the release of the Nintendo Entertainment System (NES) in 1985. Although there have always been female video and computer game players (an early computer game, *Colossal Cave Adventure,* was in fact created in 1975 by William Crowther for his two young daughters), early sales of NES systems and game titles were mainly by and for boys and male adolescents.

A *girl's game* is frequently defined as a game designed for and marketed to young girls and adolescents. This use of the term to refer to games enjoyed by or marketed to women may be derogatory, although some adult women have reappropriated the term. Some of the earliest attempts to attract young female players involved adapting popular girls' toys and stories into video game form, such as Mattel's *Barbie Fashion Designer* (1996). The success of this game led to further titles that offered young girls the opportunity to engage in hair styling, clothing design, horseback riding competitions, and friendship adventures. These were counterposed to the more male-coded game activities, such as shooting guns, defeating monsters, and virtual sports competitions.

Following the success of *Barbie Fashion Designer*, a number of female-owned and female-designed software companies were founded to try to widen the game market to include young girls (adult women were generally not a target market). These include Purple Moon, Her Interactive, Girl Games, Girl Tech, and, later, Silicon Sisters. Other game software companies diversified their offerings by creating girl games in addition to their more male-oriented and general audience games. Of these early women-helmed development companies, only Her Interactive remains in operation as of 2019.

Efforts continue to bring more women and girls into game development. Girls Make Games is a series of summer camps across the United States aimed at getting more women involved in the game industry. In 2017, Google Play launched its Change the Game program, which is aimed at supporting women as both mobile game players and designers. The program sponsors design challenges, highlights games with diverse characters and designers, and hosts information on its website about the role of women in mobile gaming.

Although some applaud the creation of girls' games, others have criticized the way categorizing games by gender reinforces negative stereotypes. Mobile game download sites contain numerous game apps for girls that involve cleaning, childcare, and fashion design, for example. Some fear that having a separate category of girls' games may prevent game designers from discontinuing the practice of primarily designing big-budget, high-quality games for boys and men, leaving games that appeal to girls as a token gesture to a market for whom the industry is not truly designing. Opponents note that many girls' games are designed by women, giving them an entry into an industry that is otherwise still dominated by men.

However, market research has demonstrated that girls and boys favor different activities and characteristics in games. Yasmin B. Kafai's 1994 study, "Video Game Designs by Girls and Boys: Variability and Consistency of Gender Differences," found that girls strongly prefer realistic settings and androgynous characters. Kafai also studied how girls and boys chose to design video games when given the opportunity to do so and found that girls created games with little or no violence or aggressive competition. In 1996, Leslie Miller, Melissa Chaika, and Laura Groppe's study, "Girls' Preferences in Software Design: Insights from a Focus Group," indicated that girls' preferences in video games differ from boys' preferences. The girls in their study liked games that focus on exploration and collaboration. They also prefer high-quality graphics and sound design. Additional studies have produced similar findings (see, e.g., Ochsner 2015).

Examples of girls' games include *Barbie Fashion Designer* (Mattel, 1996), *McKenzie and Co.* (Her Interactive, 1995), *The Vampire Diaries* (Her Interactive, 1996), *Let's Talk about Me* (Simon and Schuster Interactive, 1996), *Secret Paths in* *the Forest* (Purple Moon, 1997), *The American Girls Premiere 2nd Edition* (The Learning Company, 1998), *Keepsake* (The Adventure Company, 2006), and the *Nancy Drew Adventure* series (Her Interactive, 1998–present). A more complete listing of 1990s girls' games can be found at the FEMICON Museum website. The Girl Games website contains numerous examples of mobile game apps promoting traditional gender roles for girls.

Kara Lynn Andersen

See also: Femininity

Further Reading

American Association of University Women (AAUW) Educational Foundation Commission on Technology, Gender, and Teacher Education. *Tech-Savvy: Educating Girls in the New Computer Age*. Washington, DC: American Association of University Women Educational Foundation, 2000.

Beato, G. "Girl Games," *Wired,* April 1, 1997. Available at https://www.wired.com/1997/04/es-girlgames/.

Cassell, Justine, and Henry Jenkins. "Chess for Girls? Feminism and Computer Games." In *From Barbie to Mortal Kombat: Gender and Computer Games*, edited by Justine Cassell and Henry Jenkins, 2–45. Cambridge, MA: MIT Press, 1998.

Castell, Suzanne de, and Mary Bryson. "Retooling Play: Dystopia, Dysphoria, and Difference." In *From Barbie to Mortal Kombat: Gender and Computer Games*, edited by Justine Cassell and Henry Jenkins, 231–261. Cambridge, MA: MIT Press, 1998.

Corley, Troy. "Her Turn: Women-Owned Software Firms Are Challenging the Male-Dominated Market with Competitive Fantasy-Based Games for Girls." *Los Angeles Times*, June 6, 1997.

Cunningham, Carolyn M. *Games Girls Play: Contexts of Girls and Video Games*. Lanham, MD: Lexington Books, 2018.

Cunningham, Carolyn Michelle. "She Designs Therefore She Is?: Evolving Understandings of Video Game Design." In *Examining the Evolution of Gaming and Its Impacts on Social, Cultural, and Political Perspectives*, edited by Keri Duncan Valentine and Lucas John Jensen, 147–169. Hershey, PA: IGI Global, 2016.

Dibbell, Julian. "A Marketable Wonder: Spelunking the American Imagination." *Topic Magazine* (Autumn 2002). Available at http://www.juliandibbell.com/texts/cavespace.html.

Dickey, Michele D. "Girl Gamers: The Controversy of Girl Games and the Relevance of Female-Oriented Game Design for Instructional Design." *British Journal of Educational Technology* 37, no. 5 (2006): 785–793.

FEMICON Museum. Rachel Simone Weil. Available at http://www.femicom.org/collection/.

Fisher, Stephanie, and Jennifer Jenson. "Producing Alternative Gender Orders: A Critical Look at Girls and Gaming." *Learning, Media and Technology* 43, no. 1 (2017): 87–99.

Girl Games. Cool Games. Accessed September 17, 2020. Available at http://www.girlgames.com/search.html?query=Cool+Games.

Girls Make Games website. Accessed September 17, 2020. Available at https://www.girlsmakegames.com/.

Google Play. Change the Game website. Accessed September Available at https://play.google.com/about/changethegame/.

Harvey, Alison, et al. "'Everyone Can Make Games!': The Post-Feminist Context of Women in Digital Game Production." *Learning, Media and Technology* 15, no. 4 (2015): 576–592.

Kafai, Yasmine B. "Video Game Designs by Girls and Boys: Variability and Consistency of Gender Differences." In *From Barbie to Mortal Kombat: Gender and Computer Games*, edited by Justine Cassell and Henry Jenkins, 90–114. Cambridge, MA: MIT Press, 1998.

Kocurek, Carly A. *Brenda Laurel: Pioneering Games for Girls*. New York: Bloomsbury, 2017.

Miller, Leslie, Melissa Chaika, and Laura Groppe. "Girls Preferences in Software Design: Insights from a Focus Group." *Technology and Electronic Journal of the 21st Century* 4, no. 2 (1996): 1–6.

Ochsner, Amanda. "Lessons Learned with Girls, Games, and Design." In *Proceedings on the Third Conference on GenderIT*, 24–31. New York: ACM, 2015. Available at http://doi.acm.org/10.1145/2807565.2807709.

Reijmersdal, Eva A. van, et al. "Why Girls Go Pink: Game Character Identification and Game-Players' Motivations." *Computers in Human Behavior* 29, no. 6 (2013): 2640–2649.

Schott, Garreth R., and Kirsty R. Horrell. "Girl Gamers and Their Relationship with the Gaming Culture." *Convergence* 6, no. 4 (2000): 36–53.

Weatherford, Margaret. "Beyond the Virtual Salon—Software Games for Girls." *IEEE Computer Graphics and Applications* 18, no. 1 (1998): 4–6.

Githuku-Shongwe, Anne

Anne Githuku-Shongwe has worked in international development and women's empowerment for over twenty years, and in 2010, she founded the company Afroes Games, a contraction neologism for African Heroes and Heroines, to develop social transformation and education games targeted at African youths. The underlying design philosophy of Githuku-Shongwe is to change the mindset of young Africans through play and social rehearsal, and in doing so, help her target audience to reimagine hope, possibility, and prosperity in Africa.

Githuku-Shongwe had left her position with the United Nations to start her game company when, as she reports, she was inspired by her own children playing games and learning about African history and important figures. Games, she saw, were an avenue to transform Africa through providing socially relevant educational content to young people, teaching them about such topics as gender-based violence, political activism versus political violence, and job-hunting skills.

Because of the ubiquity of mobile phones in Africa, Githuku-Shongwe chose to focus development on the mobile platform to reach more people.

Afroes' first game, *Moraba* (2011), emerged in response to the UNiTE campaign to End Violence against Women and Girls. The Southern African Regional Office of UN Women commissioned Afroes to create an educational game to teach people about gender-based violence. *Moraba*, then, is a quiz-based adaptation of the popular Southern African board game Morabaraba (known also as Umlabalaba or Zulu Chess). It provides the player with the knowledge and a metric through which increased knowledge and understanding can be measured, and players cannot progress in the game without answering the questions. Based on posttests, Githuku-Shongwe and her team found that playing the game changed people's attitudes and actions, and it also helped people understand their own self-efficacy around sexual health and attitudes.

Following this award-winning game, Githuku-Shongwe developed a series of two games in the Haki Chaguo Ni Lako line: *Haki* (2011) and *Haki 2* (2012). Both are based in Kenya (Githuku-Shongwe's birthplace) and are about sustainability, but in radically different ways. *Haki* is about environmental sustainability and preservation, teaching players about the wide-ranging negative effects of deforestation. *Haki 2* is in response to the 2008 elections in Kenya, which saw wide rioting and political unrest. *Haki 2*, then, asks players to imagine a different way of participating in political processes, ultimately promoting peace and tolerance. A later work, *JobHunt* (2015), asks players to imagine themselves as an online worker, looking for and maintaining work while managing resources and building skills.

Githuku-Shongwe has received multiple awards, including being named as a Schwab Foundation World Economic Forum Social Entrepreneur of the Year in 2013 and the National Award: Order of the Grand Warrior from the president of Kenya. Afroes games have also received awards such as the United Nation's PEACEApp award for *Haki 2*, Meffys Award in London, and the Netexplo Award in Paris for *Moraba*.

Anne Githuku-Shongwe is now the representative for UN Women's South Africa Multi-Country Office (SAMCO), which is responsible for women's empowerment and gender equality in Botswana, Lesotho, Swaziland, and Namibia as well as South Africa, where the office is based.

Jennifer deWinter and Carly A. Kocurek

See also: Afroes

Further Reading

Lionesses of Africa. "Anne Githuku-Shongwe." Accessed September 17, 2020. Available at http://www.lionessesofafrica.com/lioness-anne-githuku-shongwe.

Vital Voices Global Partnership. "Anne Githuku-Shongwe." Accessed September 17, 2020. Available at https://www.vitalvoices.org/people/anne-githuku/.

Glitches

Glitches are temporary audiovisual disruptions of gameplay. From a technical standpoint, a glitch indicates a synchronization problem, or a runtime error, a temporal slip in the communication between the software, the operating system, and the hardware of a computer gaming system. Glitches therefore signify the characteristic dualism of video games as both material and digital objects, and while they occur more or less randomly and are usually temporary, their consequences can be dire, running the gamut from momentary malfunctions—frozen controls, visual lag, screen tearing, looping of avatar actions—to game crashes and even complete system failures. Considered from the vantage point of semiotics, glitches simultaneously indicate and disrupt the various interlaced digital and material systems involved in running a video game. Arguably, these semiotic qualities are also the reason why glitches have recently become both narrative devices in their own right as well as subjects of metagames. Besides game design and academic video game studies, materiality and cultural studies have both inquired into the ambivalences that glitches represent.

From a technical standpoint, glitches belong to the broader category of computer errors. They differ from other similar errors, such as "bugs," that is, syntactical errors in a game's code that violate the grammatical rules of a programming language. Bugs may disrupt a game's functionality and can even lead to hardware crashes. Whereas glitches are temporary and random, indicating momentary desynchronization, bugs occur regularly, are replicable, and can inhibit gameplay more comprehensively. They result from either erroneous source code, unforeseen results of controller input and game engine functions, unauthorized alterations to a game's code (like modding), or modifications to the hardware system. Some bugs have become expected features, which gamers exploit to circumvent certain challenges.

Viewed from a cultural studies angle, glitches illustrate and reify the line between the digital and material dimensions of games, a line that is usually camouflaged by an ideology that privileges seamless system performance. The very processes that enable gameplay also enable errors and glitches. Within the larger category of errors, glitches mark both the limits and the promise of (digital) communication. Cultural studies scholars assign special significance to such errors, as they identify the contemporary moment as one characterized by, as Mark Nunes terms it, an ideal of "maximum performance," that is, the seamless and continuous circulation of information (2010, 4). Nunes argues that errors expose control as the primary organizational principle underpinning communication; they signify "not only a systems failure, but also its operational logic" (3). Under this regime, the error needs to be minimized to ensure seamless performance, yet it is also the very thing that drives optimization of performance. Errors, therefore, present creative potential and, in some instances, even a revolutionary poetics, specifically, when they provoke reflections about the player's own situatedness and gaming as a practice.

One attempt at exploiting this creative space opened up by glitches and their semiotic ambiguity occurs in a recent trend in avant-garde installation art, glitch art, which makes purposefully caused glitches as part of audiovisual installations (as in the Museum of Glitch Aesthetics). As aesthetic objects in their own right, glitches enact the post-structuralist notions of slippage, or "incessant sliding" of the signified under the signifier, as the process is laid out by the Freudian psychoanalyst Jacques Lacan (2007, 1134). Insofar as they disrupt gameplay, glitches also appear as envoys of what Slavoj Žižek calls “imbecilic contingency” (2009, 129). They pierce the veil of gameplay to momentarily negate the illusory immediacy generated by the game’s interface.

Glitches have become a mainstay in the representational toolkit of ludonarrative texts, as games have followed suit with installation art in utilizing glitches as means for driving gameplay and narratives. For instance, the action game *Batman: Arkham Asylum* (2009) uses a sequence that tricks players into thinking their gaming system has broken down to advance the narrative of its campaign mode. *Pony Island* (2016) revolves around a penny arcade cabinet that glitches out because it is possessed by the devil. While at first sight glitches here seemingly fulfill rather mundane narrative functions compared to their avant-garde brethren, their semiotic multivalence constitutes what may be called a metaleptic convergence of narrative, gameplay, and the game’s digital and material techne.

Damien B. Schlarb

See also: Metalepsis

Further Reading

Barr, Adam. *Find the Bug: A Book of Incorrect Programs*. Boston, MA: Addison-Wesley, 2004.

Betancourt, Michael. *Glitch Art in Theory and Practice: Critical Failures and Post-Digital Aesthetics*. New York: Routledge, 2016.

Bojahr, Philipp. “Störungen Des Computerspiels.” In *Theorien des Computerspiels: Zur Einführung*, edited by Games Coop, 147–178. Hamburg, Germany: Junius, 2012.

Lacan, Jacques. “The Agency of the Letter in the Unconscious or Reason since Freud.” In *The Critical Tradition: Classic Texts and Contemporary Trends*, 3rd ed., edited by David H. Richter, 1129–1148. New York: Bedford/St Martins, 2007.

Munster, Anna. *Materializing New Media: Embodiment in Information Aesthetics*. Lebanon, NH: Dartmouth College Press, 2006.

Museum of Glitch Aesthetics (MOGA) website. Accessed September 17, 2020. Available at http://glitchmuseum.com/.

Nunes, Mark. *Error: Glitch, Noise, and Jam in New Media Cultures*. New York: Continuum, 2010.

Schlarb, Damien. “Narrative Glitches: Action Adventure Games and Metaleptic Convergence.” In *Playing the Field: Video Games and American Studies*, edited by Sascha Pöhlmann, 195–209. Berlin, Germany: De Gruyter, 2019.

Žižek, Slavoj. *The Plague of Fantasies*. 2nd ed. London: Verso, 2009.

Global Reach of Games

The notion of global games is a perspective of viewing the games industry transnationally, across every region of the world. In one sense, a global perspective can mean focusing on the way this globally spanning industry is variously experienced by different regions and their respective governmental policies, cultures of play, and games developers. In a broader sense, the term *global* can also imply a perspective of viewing these regional boundaries as interwoven in the same transnational political economy that governs the global cultural or creative industries. Both perspectives are essential to mapping and critically analyzing the political economy of play and production that constitutes the global games industry. In this entry, these two perspectives are briefly summarized with the aim of providing insight into the global issues crucial to video game studies research.

In one of the most compelling recent accounts of the games industry from a global perspective, Aphra Kerr notes that “experiences of globalisation are highly uneven around the world, with significant economic, cultural and technological variations remaining” (2017, 27). For Kerr, the digital games industry is an indispensable part of the global economy of cultural and creative industries. Moreover, video games are an instructive example of the expansionary logic underpinning global capitalism and its need to find new markets, both geographic and digital, as well as new modes of production, both centralized and co-creative.

The past decade has seen the games industry expand into various mobile platforms and digital means of distribution, greatly widening the global reach and monetization potential of games. The prominence of microtransactional monetization has contributed to the development of what many industry professionals call the “games as a service” model, where people are playing and paying for a single game over increasingly longer periods of time. Co-creative developments such as esports, livestreaming, and the continued prominence of user-generated content have each expanded the experience and livelihoods tied to games. Although it is beyond the scope of this entry to expand on these trends, it is clear a new set of challenges exist for researchers seeking to map these interwoven webs of play, production, and monetization.

To take the globally popular *League of Legends* (*LoL*) (2009–present) and its publisher Riot Games as an example, it is a game that was originally produced in Los Angeles. However, Riot Games now represents twenty-four offices around the world, and each of these offices is responsible for localizing *LoL* according to respective cultural norms and governmental policies. The in-game skeleton character Karthus, for example, had its skeletal body obscured for the Chinese servers due to cultural norms. By March 2016, Riot Games had remade Karthus’s character art for every server and removed any skeleton features, ensuring consistency across its servers and esport broadcasts. Examples of globally influenced game design, such as Karthus’s appearance, are common to many transnationally spanning games, calling into question the cultural autonomy that had previously defined cultural industries (Hesmondalgh 2013).

Further complicating the picture of a global games market is the status of many game developers operating under a larger holding company, such as Riot Games being 100 percent owned by the Chinese multinational conglomerate Tencent (whose tax registry is based in the Cayman Islands; see Kerr 2017, 61). Knowing the exact influence of a holding company such as Tencent is extremely difficult for researchers to determine; however, the presence of these large publishers is representative of the global games market and demands analysis. As newly industrialized nations, including South Korea and China, have continued to expand their reach in digital industries, the traditional economic dominance of North America and Japan in publishing games has been challenged. With reference to China's growing role in the global esports industry, Haiqing Yu notes that this commercial growth

> is a result of the state-centered approach in economic development and restructuring, particularly since the 2008 global financial crisis, with an emphasis on developing cutting-edge digital technologies, platforms, infrastructure, and economy to ensure China's leadership in emerging technologies. . . . Among the digital champions, BAT (Baidu, Alibaba, and Tencent) and their competitors have been at the forefront to challenge the platform imperialism thesis and transform global platform capitalism. (Yu 2018)

As Yu details, the Chinese government has challenged Western-operated digital platforms such as Google, Amazon, Facebook, and Microsoft through supporting companies such as Tencent both domestically and in their growing global presence (see also Tang 2019). Tencent owning a 100 percent stake in the Los Angeles–founded game developer Riot Games is one example of this growing international presence, but its portfolio of game developers is not limited to any region.

Tencent now own a majority stake in the Finland-based developer Supercell, which is responsible for *Clash of Clans* (2012–present), as well as the New Zealand–based developer Grinding Gear Games, which is responsible for *Path of Exile* (2013–present). Furthermore, Tencent currently owns a 40 percent stake in Epic Games as well as owning smaller stakes in Blizzard Activision, Ubisoft, Bluehole, and Paradox Interactive. Although by no means exhaustive and likely to change, the presence of a large transnational conglomerate operating outside of North America, Europe, or Japan and possessing these varied market interests is a substantial development in the global political economy of games. As previously mentioned, the extent of creative or cultural influence that a holding company such as Tencent possesses is unclear and warrants future research. What is evident from even a cursory look at the developers being bought up by Tencent, though, is that game production is an increasingly dispersed activity where cultural flows between regions are becoming increasingly complex as games are given digital platforms for distribution (Jin 2010).

The scope of game studies as a field has also become broader in its geographic focus (see, e.g., Jin 2010; Wolf 2015; Liboriussen and Martin 2016; Huntemann and Aslinger 2017; Penix-Tadsen 2019). It has been beyond the scope of this entry to consider the variety of geographically diverse studies of games in any detail, beyond a cursory look at China's growing role in global games. However, as the global economy of games continues to overlap and digital platforms proliferate means of distribution in myriad ways, the focus of game studies will continue to shift.

Joshua Jarrett

See also: Localization

Further Reading

Hesmondalgh, D. *The Cultural Industries*. London: Sage, 2013.

Huntemann, Nina, and Ben Aslinger. *Gaming Globally: Production, Play and Place*. New York: Palgrave Macmillan, 2017.

Jin, D, Y. *Korea's Online Gaming Empire*. Cambridge, MA: MIT Press, 2010.

Kerr, Aphra. *Global Games: Production, Circulation, and Policy in the Networked Era*. New York: Routledge, 2017.

Liboriussen, B., and P. Martin. "Special Issue: Games and Gaming in China." *Games and Culture* 11, no. 3 (2016): 227–232.

Penix-Tadsen, P. *Video Games and the Global South*. Pittsburgh, PA: ETC Press, 2019.

Tang, M. *Tencent: The Political Economy of China's Surging Internet Giant*. New York: Routledge, 2019.

Wolf, Mark J. P. *Video Games around the World*. Cambridge, MA: MIT Press, 2015.

Yu, Haiqing. "Game On: The Rise of the eSports Middle Kingdom." *Media Industries Journal* 5, no. 1 (2018). Available at https://quod.lib.umich.edu/m/mij/15031809.0005.106/--game-on-the-rise-of-the-esports-middle-kingdom?rgn=main;view=fulltext.

God Games

Narrowly speaking, a god game is a video game in which players assume an explicitly divine role in the emergent growth and development of a simulated life system. More broadly, however, god games share some characteristics with other video game genres, such as real-time strategy (RTS) games and simulation games in which players construct and manage the emergent growth of other systems, such as cities, civilizations, neighborhoods, and nations.

According to Agata Meneghelli, god games simulate the divine experiences of omnipotence, omniscience, and omnipresence (Meneghelli 2007). For example, god game players practice a form of omnipotence in their ability to create and destroy units at will with a simple mouse click. In addition, god game players typically view the simulation from an omniscient bird's-eye view—influencing multiple points of contact at once as if omnipresent. Also, Meneghelli interestingly notes that god game screens generally feature two kinds of play space: a large window into the simulated life system and a set of toolbar controls that border the window. Thus, god game play tends to oscillate between a transcendent plane (the toolbars) and an immanent plane (the window).

In his essay on *SimCity* (1989), Ted Friedman suggests that playing god games also engages players through integrative absorption (Friedman 1995). In the case of *SimCity*, players must practice multitasking to pay attention to the various demands of real-time city management. Players simultaneously monitor the window, a bar graph, and a news ticker, all while scrolling back and forth throughout the virtual city and clicking on dozens of functions. In one sense, this kind of multitasking may seem to act as a set of distractions. However, Friedman suggests that the multitasking god game player deeply identifies with the whole city as a single system in an “almost trance-like state of gameplay.” From Friedman’s perspective, this kind of engrossing experience transformatively blends together person and computer in “complete communion” (Friedman 1995). Thus, god games possess the potential to engage players in an integrative and absorbing experience.

God games also inspire some theorists to reflect on the player-game phenomenon as a divine-human metaphor. Kevin Kelly imagines that the player’s work of designing and directing an emergent video game world reflects the ongoing divine activity of creation (Kelly 1995). For example, Kelly observes that god games feature an evolving future in which players directly control global events such as the weather while only indirectly influencing the response of those simulated organisms that are affected by it. Kelly speculates that god game players come to feel interest and affection for the worlds that they make. Elsewhere, Kelly argues that technology can “advance our understanding of god-ness by experiencing the limits and powers of unfolding creations of our own” (Kelly 1999, 392). Similarly, Steven Garner (2005) suggests that creative engagement with technology is an expression of the *imago Dei*, the image of God within human beings (Garner 2005). Garner reasons that just as God might create persons, so those persons might imitate God through creative acts of their own. In his related work on subcreation and imaginary worlds, Mark J. P. Wolf (2012) extends this discussion. Just as the video game player occupies a divine role when governing activity within a virtual world, so the video game designer assumes another aspect of divinity when creating a virtual world. However, Noreen Herzfeld argues that god games do not fairly reflect the creative *imago Dei* (Herzfeld 2005). She maintains that the *imago Dei* implies a kind of mutual relationship that computers cannot reflect. Instead, Herzfeld contends that god games foster playful experiences of power and control.

SimCity creator Will Wright recalls his own form of divine-human fascination with video game design while writing *Raid on Bungeling Bay* in 1985 (Kelly 1995). While designing the game, Wright wrote a separate utility program that automatically created simple island maps for a military helicopter to bomb. After completing the game, Wright strangely found that his interest in the utility continued while his interest in the game waned. As he kept on tinkering with the utility, Wright came to understand that creating simulated life was more compelling than destroying it. This experience led directly to the development of *SimCity*. The work of Will Wright eventually led to *The Sims* series of social artificial life simulations and to the *Spore* series of evolutionary artificial life simulations.

The work of Peter Molyneux explicitly explores the religious dimension of god games in his *Populous* series and *Black & White* series. In both series, players adopt divine roles as they seek to guide, direct, protect, and prosper a simulated civilization while being opposed by enemy deities. However, each series reflects a different tone and character. *Populous* (1989) and its sequels primarily reflect the tradition of RTS war games. In contrast, *Black & White* (2001) and its sequels function more explicitly as a series of god simulators. Molyneux later designed *Godus* (2014) and *Godus Wars* (2016) as updates of his original vision in *Populous* and *Black & White*.

Several other notable video games deserve mention in this discussion. *Utopia* (1982) for the Mattel Intellivision casts players in the role of godlike island rulers, predating *SimCity*. Activision's *Little Computer People* (1985) casts players in the role of family managers, predating *The Sims*. *ActRaiser* (1990), a Super NES game, assigns the player to act on behalf of "The Master"—a deity that develops and protects an imperiled and worshipful world only to be abandoned by the populace once their deliverance is gained. RTS game series such as Sid Meier's *Civilization* (1991) reflect the gameplay of Molyneux's *Populous* series. One of the earliest iPhone games, the serialized *Pocket God* (2009), placed players in a divine role as they alternately blessed and cursed a small tribe of cartoonish islanders. Ubisoft's *From Dust* (2011) casts the player as a divine entity called "The Breath," which shapes landscapes and guides the lives of tribespeople. More recently, *Reus* (2013) allows the player to control four elemental giants as the godlike patrons of a tribal world.

Mark Hayse

See also: Education (Religious); Morality and Ethics; Spirituality; Subcreation

Further Reading

Friedman, Ted. "Making Sense of Software: Computer Games and Interactive Textuality." In *Cybersociety*, edited by Steven G. Jones, 73–89. Thousand Oaks, CA: Sage, 1995.

Garner, Stephen R. "Hacking with the Divine: A Metaphor for Theology-Technology Engagement." *Colloquium* 37, no. 2 (2005): 181–195. Available at https://www.greenflame.org/docs/Garner-HackingtheDivine.pdf.

Herzfeld, Noreen. "God Mode in Video Games." Paper presented at the 2005 Conference on Violence and Religion, Vallendar, Germany, July 6–10, 2005.

Kelly, Kevin. "Nerd Theology." *Technology in Society* 21 (1999): 387–392. Available at http://www.kk.org/writings/nerd_theology.pdf.

Kelly, Kevin. *Out of Control: The New Biology of Machines, Social Systems and the Economic World*. New York: Basic Books, 1995. Available at http://www.kk.org/outofcontrol/.

Meneghelli, Agata. *Immersione e Interattività nei God Games*. Milan, Italy: Unicopli, 2007.

Wolf, Mark J. P. *Building Imaginary Worlds: The Theory and History of Subcreation*. New York: Routledge, 2012.

Gold Farming

Gold farming is the practice of playing a game with the aim of gaining in-game experience, items, or currency that can be sold for monetary value outside of the game itself. The first instance of gold farming was in multiuser dungeons (MUDs) of the late 1980s; players would sell in-game characters or items to other players for real money (Bartle and Mulligan 2006). These "real money trade" practices were a largely niche activity in MUDs due to the high number of in-game administrators relative to players made possible by these spaces. As the internet became more widespread in the 1990s and massively multiplayer online games (MMOGs) emerged as a genre derived from the persistent virtual worlds of MUDS, real money trades became more pervasive in games and digital culture. These real money trade practices that emerged in MMOGs would become known as gold farming.

For MMO games such as *Ultima Online* (1997), *EverQuest* (1999), *RuneScape* (2001), and *World of Warcraft* (2004), ethical, legal, and philosophical questions surrounding the existence of gold farming have been a consistent source of controversy. As a popular commercial genre, MMOGs provide an ample space for gold farming practices to thrive as their vast player bases make in-game governance difficult. Moreover, as multiple ethnographers of virtual worlds have described in rich detail, significant social status is tied to a player's character and its respective level, items, and in-game money. The option to bypass the significant amount of playing time required to gain in-game social status through the exchange value of real-world money repeatedly proves be an alluring option for players, particularly those in the West, where incomes are large relative to the price of buying gold. As Torill Elvira Mortensen (2008, 216) notes when writing about *World of Warcraft*'s gold farming market, "To make 1000 gold takes at least a month of in-game collecting. I can buy it for $38.99, which is two to three hours in real-life work. The conversion rate of time is very good."

In 2006, Edward Castronova (2006, 2) estimated that the minimum size of the gold farming industry was $100 million, with the real figure for this market likely exceeding $1 billion. Exactly who is farming this gold and where varies; however, in 2008, it was estimated that that 80–85 percent of farmed gold derives from China (Heeks 2010, 7). More recently, there have been accounts of gold farming being turned to in countries facing extreme economic crises, such as Venezuela, as a means of survival (Grayson 2017). It is beyond the scope of this entry to consider the precise circumstances that gold farming practices arise in, but what is clear is that the majority of farmed gold is produced in more deprived areas of the global economy where currency inequalities make gold farming a viable practice.

From a game design perspective, gold farming presents a practice that many consider cheating, as gold buyers acquire gold, items, experience, and subsequent prestige in a way that bypasses "the full experience of levelling up and dealing with in-game constraints imposed by the rarity of resources" (Chen 2012, 48). As Mark Chen notes, some groups (or guilds) of players in *World of Warcraft* even organize raids to "systematically kill the farmers" (48). The reasoning for this extreme hostility to gold farming practices is linked to the way it can unbalance a game, creating inflation in the in-game currency as well as favoring those whose in-game skill may not match their in-game net worth.

However, at a more fundamental level concerned with the philosophy of play, there is a sense among players that gold farming infringes on the essence of a game by introducing what Roger Caillois might have called "the contagion of reality" (1958, 45). For Caillois, who was writing in the 1950s and extending many of the influential positions posited by Johan Huizinga, games were viewed as something outside of the rules, productivity, and hierarchies that govern real life. Although many of these positions have been refuted with the onset of digital games and productive play practices such as gold farming (see, e.g., Dibbell 2008), it is easy to see how the integration of real-life money into a game can diminish the experience for many players. It is this view of gold farming as an unethical and destabilizing practice that has long underpinned the governing response from game developers.

For the publishers and developers of games rife with gold farming practices, the negative associations of the act have historically underpinned their governing stance. For developers such as Blizzard Activision, emphasizing the need to protect the "fairness" of the game alongside its own property (that farmed gold is a constitutive of) has justified its attempts to govern the gold market. As Rob Pardo, vice president of game design at Blizzard Activision, put it in 2008 when asked why *WoW* is monetized through subscriptions instead of microtransactions,

> We've taken the approach that we want players to feel like it's a level playing field once they're in *WoW*. Outside resources don't play into it—no gold buying, etc. We take a hard line stance against it. What you get out of microtransactions is kind of the same thing and I think our player base would feel betrayed by it. (Chalk 2008)

Responses such Pardo's have been typical of games developers governing their play spaces; however, what is noteworthy is how quickly this regulatory stance has changed.

Since 2008, monetization models in the games industry have undergone a significant paradigm shift with the onset of the free-to-play (F2P) model. For many F2P monetization models, the sale of in-game "supremacy" goods that can give players in-game advantages have become normalized (Shokrizade 2012). What is significant about this trend is the lack of any philosophical difference for players purchasing the supremacy goods created by a game developer and the gold farmed in a game. Both transactions achieve the same aim for players, with the vital difference being that gold farming exists in a market outside of game developers' direct control. However, the conflation of these sales has not been unnoticed by the developers of MMOGs, who have increasingly incorporated legalized and official microtransactions into their games. In developments such as *WoW*'s token system, which includes the ability to bypass paying for a subscription entirely by selling the in-game gold you earn back to the developer, the future of gold farming looks destabilized.

Joshua Jarrett

Further Reading

Bartle, R., and J. Mulligan. "The Early History of Real Money Trades." *Terranova*, January 13, 2006. Available at https://terranova.blogs.com/terra_nova/2006/01/the_early_histo.html.

Caillois, Roger. *Man, Play and Games*. Translated by M. Barash. New York: Free Press, 2001 [1958].

Castronova, Edward. "A Cost-Benefit Analysis of Real-Money Trade in the Products of Synthetic Economies." *Info* 8, no. 6 (2006). Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=917124.

Chalk, Andy. “Blizzard VP Says No Micro-Transactions for World of Warcraft.” *The Escapist,* February 21, 2008. Available at http://www.escapistmagazine.com/news/view/81640-Blizzard-VP-Says-No-Micro-Transactions-for-World-of-Warcraft.

Chen, M. *Leet Noobs: The Life and Death of an Expert Player Group in World of Warcraft*. New York: Peter Lang, 2012.

Corneliussen, H., and J. Rettberg-Walker. *Digital Culture, Play, and Identity: A World of Warcraft Reader*. Cambridge, MA: MIT Press, 2008.

Dibbell, Julian. “The Chinese Game Room: Play, Productivity, and Computing at Their Limits.” *Artifact* 2, no. 2 (2008): 82–87.

Grayson, N. “The *Runescape* Players Who Farm Gold So They Don’t Starve to Death.” Kotaku, October 20, 2017. Available at https://kotaku.com/the-runescape-players-who-farm-gold-so-they-dont-starve-1819720013.

Heeks, R. “Understanding ‘Gold Farming’ and Real-Money Trading as the Intersection of Real and Virtual Economies.” *Journal of Virtual Worlds Research* 2, no. 4 (2010). Available at https://journals.tdl.org/jvwr/index.php/jvwr/article/view/868.

Mortensen, Torill Elvira. “Humans Playing *World of Warcraft*: or Deviant Strategies?” In *Digital Culture, Play, and Identity: A World of Warcraft Reader*, edited by Hilde Corneliussen and Jill Walker Rettberg. Cambridge, MA: The MIT Press, 2008.

Shokrizade, R. “Next Generation Monetization: Supremacy Goods.” Gamasutra, September 6, 2012. Available at: http://gamasutra.com/view/feature/177190/next_generation_monetization_php.

Google Play (Portal)

Launched in March 2012, Google Play is Google’s distribution platform for games, music, books, and apps for users of Android and other compatible devices. Much like Apple’s App Store, Google Play allows users to download paid or free apps and games to one or more devices under a given Google Play account.

Games offered through Google Play span an incredible range of genres, from modified console ports (e.g., the *Assassin’s Creed* series), to casual games (e.g., *Candy Crush Saga* [2012]), to “idle-click” titles (e.g., *Egg, Inc.* [2016]), to narrative adventures (e.g., *Her Story* [2015]), to endless runners (*Alto’s Adventure* [2015]), and more.

For developers, Google Play is the primary means by which they deliver apps and games to Android customers, surrendering 30 percent of all sales to Google in exchange for distribution services. Such services include usage and download dashboards (which track sales, usage telemetry, and crash logs), storefront localization, customization of markets, package verification, and more.

While not all games enable it, Google Play also offers Google Play Games as a service that enables developers to provide leaderboards, real-time multiplayer gaming capabilities, and cloud saving for their players. Similar to Apple’s Game Center, this effectively allows developers to provide these features to users through the Google Play store without requiring them to be coded from the ground up.

However, what may be the key distinction between Google Play's storefront and Apple's is the user's access to third-party apps. While Apple's App Store will only allow iPhone users access to download apps and games through the App Store itself, Google Play is but one option for Android users to acquire their apps and games. Amazon has its own Android storefront, and APK files (the installation packages for Android) can be shared and accessed by any third party who chooses to do so.

APKMirror (www.apkmirror.com) as well as other websites continues to serve as alternative repositories for APKs—an option that is appealing for those who may be looking to download a game or app that is not yet available in their Google Play region due to a publisher's soft-launching window or other restrictions.

One of the more prominent cases in which this distinction between distributing games either through Google Play or as a third party elicited broad-scale controversy; in 2018, Epic Games decided to self-publish its hit title *Fortnite* (2018) rather than sell the title through Google Play's storefront. Not wanting to surrender the 30 percent cut of every in-app purchase as required by the Google Play store, Epic Games felt the game was popular enough to entice users to visit Epic Games' web storefront to sign up for a secure third-party download instead. While Epic's financial rationale to abstain from leveraging the Google Play store was clear, critics voiced concerns that publishing outside Google Play could conceivably expose users to malware or other security issues.

Regardless, the Google Play store carries on as one of the largest digital storefronts worldwide, with over 3.3 million apps available in over 145 countries.

Nis Bojin

See also: Apps (Applications); Zapak (Portal)

Further Reading

Viennot, Nicolas, Edward Garcia, and Jason Nieh. "A Measurement Study of Google Play." In *SIGMETRICS '14: The 2014 ACM International Conference on Measurement and Modeling of Computer Systems*, 221–233, Austin, TX, June 16–20, 2014.

Grand Theft Auto Series

Released in console, PC, and handheld format from 1997 to present, the *Grand Theft Auto* series is a franchise of driving/action-adventure games that has been widely praised for innovating game design practice with the freedom and openness of its gameplay; at the same time, its realistic graphics and adult themes and violent content have generated much controversy. With the release of *Grand Theft Auto III* (2001), in particular, the series became a touchstone for how video games were maturing as a medium. However, the moral outcry inspired by *Grand*

Theft Auto III and later games in the series also revealed the residual public perception of video games as children's entertainment, despite their increasing sophistication and the aging demographic of people who play them.

The series' basic template for gameplay and content was laid out in its first two installments, *Grand Theft Auto* (1997) and *Grand Theft Auto II* (1999), which were developed by Scotland-based DMA Design and released for the Sony PlayStation. In the games, players are aligned with petty thugs who can ascend the criminal underworld by accepting a series of missions that advance them toward completing the game, but they can also indulge in a range of digressive and often violent side missions and seemingly open-ended explorations of the games' fictionalized urban spaces by getting into certain vehicles. (The three main locations explored in later games in the series—Liberty City, Vice City, and San Andreas—are each levels to be explored and unlocked in these early games.) By allowing players to prioritize freeform play over linear goal-oriented progression according to the rules of the game, the series helped pioneer and popularize the so-called sandbox game: a game (or game mode) that allows the player to experiment with its mechanics, regardless of the game's overarching goal, if any. Within the game industry, the term *sandbox* has since become widely used to describe and market any type of game or gameplay that expands the player's experience by allowing the player to play freely in its world without obligation to advancing a linear narrative—to treat the game world like a sandbox, so to speak.

Cinema
DOPPLER
TATTOO
DOPPLER
GIFT SOUVENIR
GIFT SOUVENIR

A screenshot of the Doppler Cinema in the city of Los Santos, in *Grand Theft Auto V*. (Courtesy of Mark J. P. Wolf)

Although these early games possessed many of the hallmark traits of later *Grand Theft Auto* games that would go on to garner the series both acclaim and controversy, *Grand Theft Auto* and *Grand Theft Auto II* received relatively little of either. Indeed, both games tend to be overlooked in both industry and academic discussions of the series. This has been attributed in part to the technical constraints of the original Sony PlayStation console and the games' limited two-dimensional top-down perspective on the action as well as their use of simple, non-photo-realistic sprites to represent cars and people. Although open-ended exploration and violent criminal exploits were possible, the player's perspective on them remained decidedly distanced. Instead, the series was brought to its current level of notoriety by *Grand Theft Auto III* (2001), the first *Grand Theft Auto* game to feature a real-time three-dimensional third-person perspective.

Grand Theft Auto III was initially a platform-exclusive release on the Sony PlayStation 2 (PS2). It was developed in part to showcase the graphical and storage capabilities of the next-generation console and, in so doing, appeal to the growing demographic of older gamers to whom Sony hoped to sell the PS2 as an entertainment system. The high-resolution, realistic digital worlds made possible by the PS2 made exploring and interacting with the vast urban setting of Liberty City all the more engaging, and the sandbox gameplay of the previous games in the series was suddenly met with lavish critical praise and unprecedented commercial success.

Each console game to follow *Grand Theft Auto III* in the series took advantage of advancing hardware technology to further expand these urban spaces, making them all the more elaborately detailed and open for exploration. For example, *Grand Theft Auto: Vice City* (2002) constructs a neon-lit cityscape and drug underworld reminiscent of *Scarface*-era Miami, whereas *Grand Theft Auto: San Andreas* (2004) lets players traverse the various gang-riddled neighborhoods of three cities (roughly based on Los Angeles, Las Vegas, and San Francisco) as well as the highways, deserts, and coastal regions that separate them. *Grand Theft Auto IV* (2008), the first game in the series released for the Sony PlayStation 3 and Microsoft Xbox 360, features an expanded and exhaustively detailed Liberty City, complete with five separate boroughs roughly based on those of New York City. In a gesture revealing how crucial the sheer size and scope of *Grand Theft Auto*'s game spaces have become to the franchise's success, before *Grand Theft Auto IV*'s release, Rockstar Games boasted that the game would feature an astounding one hundred hours of gameplay, encouraging players to explore and navigate the expansive Liberty City to optimize their gaming experience.

Starting with *Grand Theft Auto: San Andreas*, the series introduced some role-playing elements to gameplay, allowing players to customize the appearance, dress, and conduct of player characters through the foods they eat, the exercise they get, and the clothes they buy, all of which may affect the character's skills and actions in the game world as well as the way other characters may react to and assist them. For example, one of the first missions assigned to *Grand Theft Auto IV* protagonist Niko Bellic is to shop for new clothes to replace those he wore over on the boat from Eastern Europe. Although the task seems mundane and even arbitrary compared to the subsequent assassinations, heists, and carjackings Niko must perform, his new wardrobe serves to impress his date later that night and underscores the importance of how seemingly subtle elements of character customization may have an impact on his (and thus the player's) progress through the game.

Following the release of *Grand Theft Auto III*, the series was praised for its increased technical and aesthetic sophistication; however, it also came under fire for its newly realistic depiction of violence. Although the games' more outlandish activities—running over random pedestrians in one's stolen car, for example, or soliciting prostitutes and then beating, robbing, and even killing them—were presented by the game's designers as highly satirical and widely received by its fans as such, they also became all the more graphic with the move to three-dimensional graphics. The series' critics argued that it brought violence into a realistic urban setting and aligned its players with the perpetrators of that violence and, thus, a life of criminality and deviance. As a result, *Grand Theft Auto III* and the games that followed it have found themselves at the center of almost as much controversy as they have critical and commercial success.

Although Rockstar Games, publisher of the *Grand Theft Auto* series, has insisted the games were designed for adults, since the release of *Grand Theft Auto III*, the series has been widely decried as a menace to children, and it has been subject to censorship and prohibitive ratings practices. For example, a censored version of *Grand Theft Auto III* was released in Australia to take out the "sexualized violence" deemed particularly offensive by the country's ratings board. In the United States, the Electronic Software Ratings Board (ESRB) changed the Mature rating of *Grand Theft Auto: San Andreas* (2004) to Adults Only when its initial release was found to contain what became known as the "Hot Coffee" minigame, where players could mod the PC and console versions so that their character could engage in on-screen sex with his girlfriend. In 2005, citing the series as one of her prime motivators, Hilary Clinton proposed the Family Entertainment Protection Act, legislation that would control game ratings at the point of sale.

On September 17, 2013, *Grand Theft Auto V* was released, and with a combined development and marketing budget estimated at $265 million, it was the most expensive game ever made. The game made $800 million during its first day of release and surpassed $1 billion within three days, making it the fastest-selling entertainment product in history; by 2019, it had made around $6 billion in worldwide revenue. The game is set in an even larger game world than *Grand Theft Auto IV*, and it involves many of the same activities, with new details, better graphics, improvements in lighting, and greater draw distances (allowing one to see more detail in the distance). The game received both critical and popular acclaim, ensuring a bright future for the series. *Grand Theft Auto Online* was released on October 1, 2013, and *Grand Theft Auto VI* is underway, though as of October 2020, no release date has been announced.

The moral outcry over the *Grand Theft Auto* series has come under fire from academics and the games industry alike. Both parties have argued that the controversy reveals that, although the audience demographics of video games have shifted to include adult tastes and interests and game technology has advanced to the point that it can accommodate these shifting demographics, there remains a residual cultural perception of games that trivializes them as immature and children's entertainment rather than a legitimate cultural form.

Jessica Aldred

See also: Immersion; Journalism; Morality and Ethics; Platforms

Further Reading

Frasca, Gonzalo. “Sin Sim City: Some Thoughts about *Grand Theft Auto 3.*” *Game Studies* 3, no. 2 (December 2003). Available at http://gamestudies.org/0302/frasca/.

Garrelts, Nate, ed. *The Meaning and Culture of Grand Theft Auto: Critical Essays*. Jefferson, NC, and London: McFarland & Company, 2006.

Miller, Kiri. “The Accidental Carjack: Ethnography, Gameworld Tourism, and *Grand Theft Auto*.” *Game Studies* 8, no. 1 (September 2008). Available at http://gamestudies.org/0801/articles/miller.

Graphics

In the context of computer science, the expression *graphics* refers to the visual output produced on a screen through the underlying operations of physical and algorithmic processes. The study of video game graphics encompasses a great variety of technological devices and processes that have evolved considerably over the short history of the medium. As Mark J. P. Wolf has pointed out, video game researchers are faced with many interstitial cases, such as board games that make use of video material or LED/LCD-based handheld game devices in which all the variations of the game state are represented through discrete image fragments to be lit at the appropriate time. This overview of video game graphics is limited to devices that can manipulate a grid of identical visual units—commonly referred to as *pixels*—to construct images.

When video games appeared in arcades, a typical television set could reproduce a relatively complex color signal broadcast over the air. To create an interactive experience, early video games had to give up most of the rich visual stimuli people had enjoyed on television sets. Although cathode-ray tubes (CRTs) could display images with thousands of colors at nearly thirty times every second (the NTSC standard), the underlying machinery used to create video games could not make full use of that potential for many years. Throughout the history of graphics in video games, the goal of developers and engineers has been twofold: increasing the illusionistic potential of interactive imagery and making sure that these images can react in a significant manner to user input. Multiple technological advances allowed game developers to remediate visual techniques developed in visual arts and film and to refine the algorithmic manipulation of visual assets, a process that is essential to the creation of a greater sense of reactivity to user input.

THE REFINEMENT OF ILLUSION

The TV game project designed by Ralph Baer in the late 1960s made use of a relatively simple array of transistors and diodes to generate three white dots on the screen. Here, pixels can be understood as timing in the circuitry that determines when the electron guns at the back of the CRT light up, a process that was impacted by the modulation of current through potentiometer-based controllers. The famous “Brown Box” could also switch the color of the whole screen to change the nature of the simulated events: a blue screen was meant to evoke the ice of the hockey rink, a green screen became a football field, and so on. However, that function was removed in the final product, the Magnavox Odyssey (1972), and replaced with twelve acetate overlays that represented a variety of settings, from a simple tennis setup to a haunted house. The decision to rely on exogenous visual elements is clearly indicative of the representational ambitions of games that would qualify as abstract art to distant onlookers. The hardware limitations of the time were more suited to specific make-believe scenarios. The popularity of space settings in early games is a clear indication of the representational affordances created by technology: a black backdrop could depict the emptiness of space with minimal costs in terms of technological resources.

Computer Space (1971) was already able to depict a complex animation; Nolan Bushnell’s board integrated diode arrays representing various positions of the player spacecraft that were manipulated further by TTL components to rotate the ship on the screen. In 1974, *Tank!* became the first video game to use a memory chip (read-only memory [ROM]) to store graphical information, an innovation that would be a turning point in the development of richer visual assets. Depending on their capacity, memory chips can store arrays of pixels, typically referred to as *bitmaps*, that are assembled by the program and sent as a video signal to the display. In raster mode, the electron beam at the back of the CRT scans the surface of the screen many times every second to recreate the image. For example, the first Atari arcade games were played on CRTs that could display a grid of 336-by-244 pixels, in theory. Screen resolution was not the factor responsible for the “blockiness” of early games; the inability to manipulate detailed bitmaps led to the use of large, uniformly colored “blocks” in many games.

While early video games had to rely on overlays to overcome their monochrome displays, the release of the Fairchild Channel F (1976) and the Atari VCS 2600 (1977) marked the transition to color games and a race to overcome the hardware limitations in terms of color palettes and simultaneous on-screen colors. In 1979, *Galaxian* was the first arcade game to display graphics in three-channel RGB color. Still, memory limitations prevented developers from integrating large and detailed bitmaps at the time.

In the early years, game worlds were often depicted from a lateral or aerial vantage point. The integration of higher-resolution bitmaps made it easier to represent objects from various angles, adding some volume to the scenes. For example, *Zaxxon* (1982) depicted game world objects through isometric projection. This type of axonometric projection represents a tridimensional space with no vanishing points, giving all three dimensions equal importance. To convey a sense of volume or depth, video games made use of many well-known techniques used in 2-D technical drawings.

During the 1980s, the graphical adventure game genre increased in popularity and contributed to the adoption of more capable graphics cards. Developers sought to remediate visual arts to a greater extent. Complex visual scenes were appearing in text adventure games from Level 9 and Magnetic Scrolls. In the early

1980s, such images were constructed through drawing instructions executed by the program as players progressed in the storyworld (Aycock 2016). Sierra had pioneered this formula in *Hi-Res Adventure #1: Mystery House* (1980). Whereas many classic Sierra graphical adventure games were developed using the EGA visual standard (16 on-screen colors out of a palette of 64), *King's Quest V* (1990) and *Police Quest III: The Kindred* (1991) were among the first to make extended use of VGA graphics (256 on-screen colors from a palette of 262,144 colors). Digitized drawings and photographs were used to create the visual assets of these games. Some developers, most notably Access Software, used digitized photographs more extensively to produce visuals (as in *Mean Streets* [1989]). The remediation of pictorial arts was further facilitated by improvements over IBM's VGA standard by other manufacturers; Super VGA games could run at 640-by-480 or even higher resolutions.

In many early games, dynamic objects (e.g., the vehicle controlled by players) moved laterally across the screen without much variation in their appearance. The *Computer Space* trickery previously described, named "patch" by Bushnell, can be seen as the ancestor of the *sprite* (Lowood 2009); components dedicated to the storage and manipulation of moving objects became more common following the popularity of shooting video games. Beyond these technological implications, the term started to metonymically refer to any moving objects on the screen. With more memory and processing power available in computer architectures or components dedicated to sprites, developers were able to remediate classical animation techniques. A few years after *Karateka* (1984), Jordan Mechner's *Prince of Persia* (1989) made good use of rotoscoping, and the prince's impressive action range was brought to life with unknown fluidity for the time. For *Mortal Kombat* (1992), game developers used live-action video sequences to create animated sprites.

Fully animated images had been integrated in some laserdisc games in the 1980s (e.g., *Dragon's Lair* [1983] and *Time Gal* [1985]); however gameplay was limited, and relatively few such games were produced. With CD-ROM technology, the video game industry attempted to replicate a film-like illusion of motion in video games, but the quality of full-motion video (FMV) varied greatly from game to game. The long-running *Tex Murphy* series illustrates the evolution of FMV integration, from a few frames of digitized video displayed in tiny windows (*Martian Memorandum* [1991]) to the full screen live-action sequences presented in *Overseer* (1997). *Under a Killing Moon* (1994) featured a common compromise adopted at the height of the FMV craze. Live-action cutouts were integrated directly on a static digitized photograph or CGI backdrop and animated at approximately ten frames per second.

In addition to digitized drawings, photographs, and movies, prerendered synthetic images were also commonly used to create visual assets in the early 1990s. Games such as *The Journeyman Project* (1993) and *Myst* (1993) popularized virtual worlds that could be explored through then breathtaking computer-generated images. Most of the assets for *Donkey Kong Country* (1994), from backgrounds to animated sprites, were prerendered on Silicon Graphics workstations. The basic steps to create computer-generated images and animations remain the same to this day: artists model objects and scenes from geometric primitives, textures are applied to the modeled surfaces, and specific algorithms handle phenomena such as lighting, liquid, and volatile matter. Virtual skeletons are incorporated into objects, with each joint possessing its own set of attributes. For more realistic movement, animators often rely on the technique of motion capture: a performer executes the needed movements wearing a special suit equipped with a set of captors at key joints, allowing the movements to be recreated digitally.

THE LANGUAGE OF ILLUSION

The development of bitmap-based imagery involves many procedural manipulations, which can be hardwired into the systems' infrastructure or completely handled by software. In many two-dimensional games, bitmaps are tiled to form a larger scene, and sprites move on the screen according to specific algorithms that simulate inertia or gravity. Through the technique of scrolling, first introduced in *Super Bug* (1977), game worlds appear progressively on the screen; the motion is either controlled by the computer (as in *Xevious* [1982]) or in response to user navigation (as in *Defender* [1980]). In 1982, Irem's *Moon Patrol* featured an impressive parallax scrolling: three independent, overlapping layers of scenery moved at various speeds, producing an illusion of depth. With hardware or algorithms that can scale or rotate bitmaps, developers were able to make game worlds move in new ways and even direct the gameplay on the z-axis (as in *Hang-On* [1985] and *Space Harrier* [1985]).

The three-dimensional models used by CGI artists are mathematically formulated and thus can be manipulated endlessly by the computer; a rendered image is but one of many possible actualizations of the model. But prerendered imagery is at odds with the reactivity expected by players in the course of the interactive experience; the ideal apparatus should be able to manipulate objects and spaces in real time. Even though three-dimensional graphical conventions developed at an accelerated pace during the 1990s, these techniques were developed much earlier in the form of vector games. On a vector display, the CRT's electron beam only draws primitive shapes such as points or lines instead of scanning the whole screen. Vector primitives were also formulated mathematically and thus could be manipulated easily. This technique allowed developers to create two-dimensional games with sharp images and fluid movement, such as *Asteroids* (1979). Many years later, *Another World* (1991) still impressed the gaming community with its two-dimensional vector graphics engine that provided smooth animation.

Vector displays quickly became associated with the creation of three-dimensional worlds. In 1980, *Battlezone* offered the first true three-dimensional environment in a video game. The world's objects were made of basic geometric shapes (cubes and pyramids). To represent solid three-dimensional objects, polygons had to be filled in, something vector displays could not easily achieve. In 1983, *I, Robot* became the first title to depict its game world with filled-polygon graphics using a raster display. This type of imagery has been associated with the vehicular simulation genre through long-running series such as *Falcon* (1987) and *Chuck Yeager's Advanced Flight Trainer* (1987). Three-dimensional gaming's popularity increased swiftly following the release of *Doom* (1993). Id

Software's landmark title featured a game engine that rendered textured environments in real time, although objects (such as power-ups and enemies) were made of sprites scaled in response to the user's virtual position.

In 1995, the game engine designed for *Descent* rendered most of its game world and inhabitants with textured polygons, as did *Quake* in 1996. Id Software released a version of this new blockbuster running under Windows 95 that made good use of one of the first 3-D acceleration graphics cards produced for personal computers: the 3-Dfx Voodoo (1996). Many innovations introduced by the *Quake* engine pertained to the necessity of limiting the number of polygons and amount of information to be calculated at any time so the game could run on limited hardware. To this day, three-dimensional games use many rendering shortcuts to run at a decent frame rate. Arcade games and home consoles, too, gained three-dimensional capabilities; engineers now tried to produce hardware that could manipulate ever more astronomical amounts of polygons. According to Sony, the first PlayStation (1994) was able to handle 360,000 polygons per second, and the NEC PowerVR Series II that powered the SEGA Dreamcast (1999) was said to handle up to 3.5 million polygons per second.

CGI artist Alvy Ray Smith once estimated that eighty million polygons per second would be required to reproduce reality on the screen. It would be naïve, however, to think that the sole challenge of game engines resides in geometrical complexity. Polygons, as Steven Poole insisted (2000), might be the "building bricks" of contemporary video games, but our visual world is populated with phenomena infinitely less tangible than bricks; water, smoke, fog, fire, and explosions are difficult to mimic with simple textured polygons. To simulate the subtle visual behavior of these phenomena, developers use *particle systems* in which the behavior and appearance of simple, primitive shapes are handled by algorithms and can be modified in response to the actions of the user or other elements of the simulated world.

Within animation, artificial intelligence (AI) determines how characters act in the environment and react to the virtual world's other actors. Virtual physics simulate gravity and calculate the intensity of deflagrations in real time. As they integrate dynamic behavior models, game worlds explore a whole new layer of visual realism. Although video games do not evolve solely to integrate ever more complete and complex simulation models, as new techniques emerge and video games strive to refine their power of illusionistic deception, it is undeniable that these models, too, will affect the way we look at games.

Carl Therrien

See also: Artificial Intelligence

Further Reading

Arsenault, Dominic. *Super Power, Spoony Bards, and Silverware: The Super Nintendo Entertainment System*. Cambridge, MA: MIT Press, 2017.

Aycock, John. *Retrogame Archeology: Exploring Old Computer Games*. New York: Springer, 2016.

Bolter, Jay David, and Richard Grusin. *Remediation: Understanding New Media*.

Cambridge, MA: MIT Press, 1999.

Burnham, Van. *Supercade: A Visual History of the Videogame Age, 1971–1984*. Cambridge, MA: MIT Press, 2003.

Lowood, Henry. "Videogames in Computer Space: The Complex History of Pong." In *IEEE Annals of the History of Computing*. IEEE Computer Society, 31 *July–September 2009): 5–19.

Monfort, Nick, and Ian Bogost. *Racing the Beam: The Atari Video Computer System*. Cambridge, MA: MIT Press, 2009.

Poole, Steven. *Trigger Happy: The Inner Life of Videogames*. Fourth Estate, 2000.

Therrien, Carl. "Graphics in Video Games." In *The Video Game Explosion: A History from PONG to PlayStation and Beyond*, edited by Mark J. P. Wolf, 239–250. Westport, CT: Greenwood Press, 2007.

Therrien, Carl. *The Media Snatcher: PC/CORE/TURBO/ENGINE/GRAFX/16/CDROM2/SUPER/DUO/ARCADE/RX*. Cambridge, MA: MIT Press, 2019.

Wolf, Mark J. P. "Imaging Technologies." In *The Video Game Explosion: A History from PONG to PlayStation and Beyond*, edited by Mark J. P. Wolf, 9–12. Westport, CT: Greenwood Press, 2007.

Wolf, Mark J. P. "Z-Axis Development in the Video Game." In *The Video Game Theory Reader 2*, edited by Bernard Perron and Mark J. P. Wolf, 151–158. New York: Routledge, 2008.

Guides. *See* Game Guides

H

Hacking

Hacking refers to acts of technological manipulation (known as *hacks*) that result in the reappropriation of systems, software, or hardware. Hacking can be as sophisticated as decrypting a government security system and as elementary as a workplace prank. The term has developed to describe the activities of the subculture group known as *hackers*. Hacking is often referred to as an illicit or illegal activity, and hackers are typically cast as the anarchists of the information age. Cultural anxiety has risen as government cyberwarfare divisions begin to adapt the tools of hackers for espionage. The history of hacking and the hacking practices that have evolved and endured are the two factors that inform the current understanding of this social practice.

The subject of *hacking* has been analyzed in the fields of information and technology studies, computer science, new media studies, cultural studies, and political science. It has been discussed more colloquially in reference to proper internet behavior and video game modification.

THE HISTORY OF HACKING

Despite its association with computer technology, hacking has been a cultural phenomenon since the 1910s. Early amateur radio operators occasionally accessed naval frequencies and hassled communications officers with false or obscene messages. During the 1960s, a noncomputer hack known as “phone freaking” was developed. The hack targeted phone systems and allowed people to call around the world free of charge if they knew how to produce a high-pitched whistle at the appropriate moment.

The first written description of *computer hacking* can be found in Joseph Weizenbaum’s book *Computer Power and Human Reason* (1976). However, the practices and beliefs associated with computer hacking have been evolving since the 1950s. Computer science students in prestigious universities created some of the hardware and software that became the basis for modern computers. During the 1960s and 1970s, a new group of computer enthusiasts took the hardware of their cultural ancestors and began to experiment with advanced computer programs and the internet. By the 1980s, a complete computer subculture had developed with its own beliefs and rituals. Over those thirty years, this subculture established hacking as a key use of computer technology.

Accounts from computer science departments in the early 1980s describe the aesthetics of hacking. A successful hack used simple means to achieve a surprising result. The status of a hack was determined by the hacker's ability to demonstrate his or her expertise by trespassing in a large system in an amusing way. Novice hackers engaged in hacking "mastery games" to prove their worth to the group. Sherry Turkle describes the development of a hacking ethos in her book *The Second Self: Computers and the Human Spirit* (1984). The ethos is predicated on the phrase "information wants to be free," a motto first articulated in the 1950s by the MIT students that developed the first multiple-access user system computer program. For these pioneering computer engineers, hacking was an attempt to achieve the utopian potential of the computer through an emphasis on decentralized power and technolibertarian principles. Hackers aligned their activities against those of the "straights," who used the computer as a business tool and not as a "magical machine."

Journalists, authors, and filmmakers bolstered the countercultural status of early hackers and hacking. In these accounts, hacking was an exciting act of protest from a group of misunderstood loners against powerful corporations or governments. The legacy of this characterization is present in the cyberpunk fiction of the 1980s and in films such as Ian Softley's *Hackers* (1995) and the Wachowskis' *The Matrix Trilogy* (1999–2003).

By the mid-1990s, businesses had adopted computer technology and digitized labor. Hiring members of the hacker subculture became a standard practice. Technology companies redesigned the standards of professionalism to accommodate the work modes and interests of hackers. Books such as Douglas Coupland's *Microserfs* (1995) and Andrew Ross's *No-Collar: The Humane Workplace and Its Hidden Costs* (1991) describe the work environment of this second stage of hacking. Hackers of this era had become largely domesticated by the lure of a steady paycheck, health benefits, and the corporate campus work environment. At the same time, news stories villainized hacking by painting all acts of transgressive computer use with the same brush. Reports of hackers breaking into bank accounts and the mailbox of the Duke of Edinburgh conflated hacking with cracking. *Cracking* refers to the deliberate, malicious form of hacking designed to cause destruction or theft. If hacking is equal to trespassing, then cracking is vandalism. The negative press portrayals of hacking and the hacker migration to corporate campuses brought hacking into the mainstream. This second stage of hacking informs contemporary understanding of the activity. Hacking is now associated with the "good" activities of corporate IT departments or with the "bad" or dangerous practices of malicious groups of internet criminals.

Situated between these charged poles is the open-source movement. *Open-source* refers to the independent creation and free distribution of computer software. Open-source content is "open" because it is designed to allow anyone to view and improve the code for the software. Thus open-source content is constantly evolving through the collective hacking of a nonhierarchical network. The Linux operating system is the most notable achievement of the open-source movement. Members of the open-source community value the purity of anti-capitalist hacking. They share the utopian beliefs of the earliest hackers and use their collective computer knowledge to produce free content.

If the open-source movement is connected to the earliest hackers, then the hacktivist movement is the descendent of 1980s prankster hacking. *Hacktivism* is a term that describes politically motivated, direct-action hacking. The hacktivism movement is described in the book *Hacktivism and Cyberwars: Rebels with a Cause?* (2004) by Tim Jordan and Paul A. Taylor. The authors explain that this type of hacking is made possible by the collaborative nature of our networked society and the history of popular protest. Examples of hacktivism include the 1999 Seattle protest of the World Trade Organization (WTO). Hacktivist protestors successfully crashed the WTO website for the conference by collectively bombarding it with repeated page requests. The protestors succeeded in dismantling a tool of the conference and made their political opposition felt. The political agenda of the hacktivist movement complements the beliefs and practices of the hacking community.

HACKING ETHOS IN VIDEO GAME CULTURE

The history of hacking reveals several consistent elements of the activity. Hacking is based on a reverence and delight in the mastery and exploration of computer technology. Even in its most institutionalized forms, within corporations, the desire to participate in interesting hacks keeps employees engaged with the goals of the company. At the same time, there is an element of transgressive play involved with hacking. Hacking often expresses itself in opposition to the mainstream and to commercial desires. It is striking how the beliefs of the hacker community have helped to frame the mainstream understanding of internet culture. File sharing, internet pranking, and the hacker work ethic (defined by the blending of leisure and work) represent many of our computer experiences.

Examples of hacking are prevalent in the context of video game culture. Indeed, a study by Goode and Kartas (2012) has shown that some gamers chose their preferred video game console based on its ability to be hacked and modified. The modding of video game consoles is hacking that has parallels with the earliest computer programmers and hardware tinkerers. *Modding* is a hack that requires the reappropriation of video game hardware and software. Modding a video game console improves the technology for the user and can enable the hacker to store, play, and access games in a way that was not originally intended. For example, modding software can add creative elements to the game that were not originally conceived. Popular mods often require hours of painstaking coding and demonstrate the author's expertise and knowledge of the technology.

Hacking the source code of video games has led to the creation and distribution of mods, macros, bots, and add-ons. This hacking activity is similar to the efforts of the open-source movement. Some games encourage their users to engage with this code and create new gameplay possibilities. During the release of Valve Software's *Half Life 2* (2004), the company released information on how to access the programming code and encouraged gamers to modify the game. Other games try to keep the code hidden but are hacked by game players, and the code is then made available to the larger community. Code hacking in video games allows certain users an advantage in the world of the game or allows users to fix a perceived limitation. Hacking the source code of video games brings to the forefront issues of proprietary ownership and cheating.

Some game communities believe that the use of particular mods violates the spirit of the game and reflects poorly on the status of the gamer. Other mods are considered useful additions that were overlooked by the game designers but do not offer any clear advantages over other players. The politics of mods is specific to the game communities that police them. For example, in the game *EVE Online* (2003), several gamers used a "glider" mod that enabled them to automate mining for resources while they were away from their computers. A coordinated attack known as "Hulkageddon" was organized against gamers that employed this mod in an effort to police this form of hacking.

Other examples of collective action have a more political purpose that reflects the ethos of hacktivism. In July 2003, a protest in *Second Life* by a group of residents involved the virtual destruction of crates of tea and the raging of bonfires. The protestors were unhappy with the tax system the game's architects had employed. Through their hijacking of the gameplay, these protestors were able to gain concessions from the game designers.

It is clear from these examples that hacking is a daily reality in video game culture. The hacking activities of many gamers reflect the attitudes of the earliest computer designers. As game design embraces online components, it is reasonable to assume that collective hacking will become an increasingly common part of the gaming experience.

Ethan Tussey

See also: Cheating; Co-Creativity; Cooperative Gameplay; Easter Eggs; Emulators; Game Modifications; Machinima

Further Reading

Bergstrom, Kelly. "*EVE Online*: Cheating." In *How to Play Video Games*, edited by Matthew Thomas Payne and Nina B. Huntemann, 301–308. New York: New York University Press, 2019.

Coupland, Douglas. *Microserfs*. New York: HarperCollins, 1995.

Goode, S., and A. Kartas. "Exploring Software Piracy as a Factor of Video Game Console Adoption." *Behaviour & Information Technology* 31, no. 6 (2012): 547–563.

Himanen, Pekka. *The Hacker Ethic and the Spirit of the Information Age*. New York: Random House, 2001.

Jordan, Tim, and Paul A. Taylor. *Hacktivism and Cyberwars: Rebels with a Cause?* New York: Routledge, 2004.

Ludlow, P., and M. Wallace. "Into the Code: Exploits, Mods, and Hacks." In *The Second Life Herald: The Virtual Tabloid That Witnessed the Dawn of the Metaverse*, 179–190. Cambridge, MA: MIT Press, 2007.

Ross, A. "Hacking Away at the Counter Culture." In *Technoculture*, edited by P. Penley and A. Ross, 107–134. Minneapolis: University of Minnesota Press, 1991.

Roszack, T. *The Cult of Information: The Folklore of Computers and the True Art of Thinking*. New York: Pantheon Books, 1986.

Thomas, D. *Hacker Culture*. Minneapolis: University of Minnesota Press, 2002.

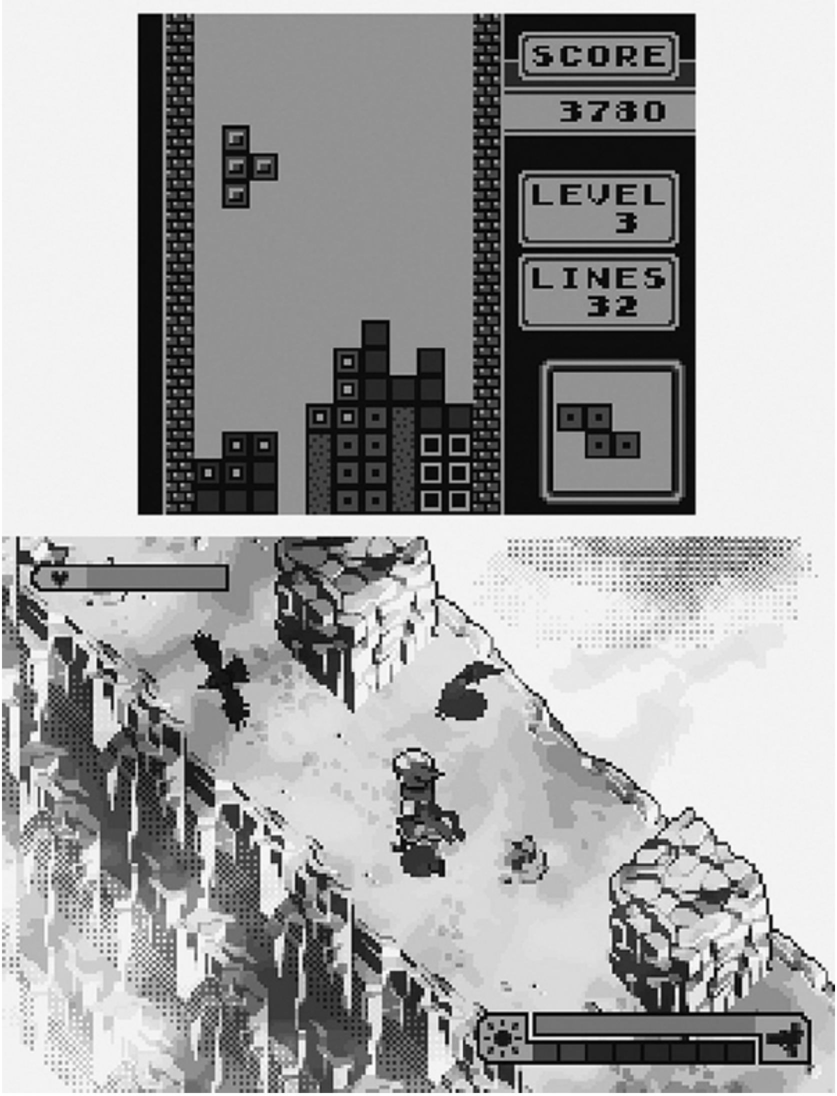
Turkle, Sherry. *The Second Self: Computers and the Human Spirit*. New York: Simon

& Schuster, 1984.

Handheld Games

The earliest significant handheld devices that served as platforms for video games (as opposed to simpler electronic or mechanical handheld games or toys) were from Microvision, released by toy company Milton Bradley in 1979, and Nintendo's Game & Watch line, which debuted in 1980. The Microvision was the first handheld system to use removable cartridges, and it was remarkably quick in adopting the model, which had only recently been pioneered by the Fairchild/ Zircon Channel F home console in 1976 and popularized by the Atari VCS 2600 in 1977. Yet, although the Microvision was intellectually ahead of its time, it was also hamstrung by poor ergonomics, a minuscule sixteen-by-sixteen pixel monochrome screen, and notoriously unreliable hardware susceptible to damage from even modest day-to-day use. Nintendo introduced its own innovation more or less in parallel: Game & Watch, a brand of lo-fi, single-game LCD handhelds. Each model was limited to a single title because the graphics and gameplay were literally etched into the screen, with a predefined set of character and obstacle positions that were created with "segmented" LCDs similar to those used in calculators and watches (hence the name; Nintendo's handhelds included a watch function). Game & Watch was cheap and fast to produce and to play, with short pseudoaction gameplay that was almost turn based with its timing and memorization-dependent mechanics. The design was the brainchild of Gunpei Yokoi, a Nintendo employee—widely regarded as handheld gaming's godfather—who was responsible not only for Game & Watch but also the original Nintendo Game Boy and (with a posthumous release in 1999, after Yokoi's death in a 1997 traffic accident) Bandai's WonderSwan, a simple yet surprisingly successful monochrome machine that held its own against Nintendo's updated Game Boy Color in the Japanese market (WonderSwan never saw a U.S. release).

It was with Nintendo's debut of the Game Boy in 1989 that handheld gaming emerged as a major market segment, and no discussion of the medium would be complete without an acknowledgment of its impact. From its introduction until its official successor, the Game Boy Advance, arrived in 2001, the Game Boy continuously dominated handheld gaming—and was arguably more successful in its field than any other juggernaut platform before or since, from the Atari VCS 2600, to Nintendo's own Nintendo Entertainment System (NES), to the Sony PlayStation 2. The Game Boy was the pinnacle of designer Gunpei Yokoi's philosophy that affordable "good enough" technology trumps the cutting edge. While Epyx and Atari packed their handheld Lynx (1989) system with impressive color graphics capabilities and a backlit LCD—including sprite rotation and scaling effects that rivaled those of Nintendo's 16-bit Super Nintendo Entertainment System (SNES) home console, despite predating it—Yokoi left the initial Game Boy model with a monochrome screen and 2-bit graphics with a mere four shades of gray-green and 160-by-144 pixel resolution. Its 8-bit Z80-based CPU was already thirteen years old at the time of the system's debut. Many of these hardware decisions resulted from Yokoi's sensitivity to the different human use cases for handheld games, particularly the importance of battery life for portability. With four AA batteries, the Game Boy could run for about ten hours, comparable to the span of today's portable consumer electronics (gaming dedicated or otherwise); meanwhile, competitors, including the Lynx and SEGA's Game Gear, topped out at around four to six hours, despite using six AA batteries.



Above: Nintendo's iconic edition of *Tetris* (1989) for the Game Boy. As a system "pack-in," *Tetris* introduced millions of players to the unique strengths of handheld gaming. Below: *Boktai: The Sun is in Your Hand* (2003) for the Game Boy Advance highlights the unusual input possibilities for handheld hardware, with a solar sensor that causes sunlight to affect

the RPG game world. (Courtesy of Mark J. P. Wolf)

The Game Boy played host to two decade-defining titles in handheld gaming: *Tetris* (1989, Nintendo version) and the *Pokémon* series (begun in 1996). Both are inextricably linked with the Game Boy brand, particularly with their reach beyond traditional gaming audiences and perception as family-friendly franchises. *Tetris* debuted as a system pack-in with the platform's launch, ensuring widespread distribution. But more important, the game embodied the unique strengths of the handheld as a mode of play: short play sessions, economy of motion, thinking over flashiness, and graphics that did not improve with size, speed, or color depth. Although *Tetris* was ported to every platform of its time, big and small, the Game Boy version saw far greater reach than its larger format, more colorful NES counterpart and was the predominant channel through which Americans were introduced to the canonical Russian puzzle game.

Seven years later, a similarly successful franchise was born with the release of *Pokémon Red* and *Blue*, a pair of role-playing games (RPGs) that simultaneously distilled the genre's essence, increasing its accessibility to a wide audience while extending it with new networking and collectible concepts that turned a solitary activity into a social one. *Pokémon* gameplay revolves around world exploration in search of new Pokémon species (*Pokémon* being a contraction of the phrase "pocket monsters"), with RPG-style turn-based battles used as a means of capturing or collecting each new type of creature. Despite its emphasis on combat, the series is oriented toward a younger audience and avoids realistic violence; Pokémon only become tired and never die.

The truly viral nature of the *Pokémon* brand is facilitated by its division into separate, individually incomplete versions; for example, the initial *Red* and *Blue* game variants each contain unique species that are exclusive to one another. Using the Game Boy's link cable, players are able to trade Pokémon, requiring collaboration to create a complete set. This simple social mechanism, anticipating the explosion of online social networking in the latter half of the 2000s, makes the franchise notable not only as a commercial success but also as a design innovation of historical significance within the game medium more generally.

Handheld gaming has also provided a notably fertile ground for new technologies, serving as an advance guard for everything from the ubiquitous four-way D-pad controller component, to multiplayer networked play, to touchscreens. Of these, the innovation with the longest historical impact on the medium is likely Yokoi's particular brand of D-pad (or directional pad) that was introduced with an iteration of the Game & Watch line in 1982. Yokoi's iconic D-pad standardized the four-way plus (or cross) formation, with a single piece of continuous plastic that has four distinct tilt positions for up, down, left, and right; proximate pairs of up-right, down-left, and so forth are also possible, providing eight input options and making both cardinal and diagonal movement immediately intuitive. The discrete, digital nature of the D-pad—on the face of it, a downside compared with more free-flowing analog joysticks—proved appropriate to the limited positional and graphical model of the era's tile-and-sprite-based 8-bit systems, and Nintendo's D-pad went on to cement its position by anchoring the controllers of the Famicom/NES and Game Boy. All major hardware primarily marketed as a gaming device (whether home console or handheld) has included the canonical D-pad ever since.

The self-contained proximity of small handheld hardware platforms—everything from the screen to the game cartridge to the controls are all within inches of one another—has made the form convenient for more unusual physical input models, such as the solar sensor found in Konami's *Boktai: The Sun Is in Your Hand* (2003) for Game Boy Advance. *Boktai*'s solar sensor detects sunlight by measuring UV-ray levels, and the game integrates this real-world state into its fiction, with sunlight a scarce and collectible commodity that must be strategically managed. *Boktai* was an early commercial example of the *tangible computing* movement that has since seen the rise of the location-based Global Positioning System (GPS) as a common input device. Further examples of physical handheld gaming include the tilt sensor found in *Mawaru Made in Wario* (2004) for the Game Boy Advance; in this collection of short microgames (played within a few seconds each), the player rotates the entire device as a means of control. Likewise, with the touchscreen, when Nintendo included the technology in its Nintendo DS handheld in 2004, it was met with skepticism over its precision and practicality (the interface-poor experience of ATMs having set a discouraging precedent). Yet, the DS went on to sell more than 154 million units worldwide as of mid-2016, anticipating the interface curve of consumer electronics, with both touchscreens and gyroscopic motion sensors now the centerpiece of Apple's iPhone and commonplace on a range of devices (meant for gaming or otherwise).

Nintendo continued this pattern with the introduction of a 3-D screen in its 3DS handheld in 2011 and 3DS XL in 2012 that was based on autostereoscopic lenticular lenses (able to produce the perception of a 3-D image on-screen without the use of any separate hardware augmentation, such as specialized glasses). The 3DS embodies the advantages that handheld gaming hardware has often held: while the rest of the consumer electronics industry seeks to establish 3-D imaging through expensive and bulky TV and theater experiences, the 3DS leverages its player intimacy to make new technology immediate and accessible with a screen technique that is only possible with an eye distance of inches rather than feet.

Competing with the Nintendo DS, the handheld PlayStation Portable (PSP) console was released in 2004 in Japan and 2005 in North America and elsewhere and was the most powerful handheld console of its time. It was eventually replaced by the handheld PlayStation Vita in 2011. Nintendo later followed up with an eighth-generation console, the hybrid Nintendo Switch, which was released worldwide on March 3, 2017. The Nintendo Switch can be used as a handheld console (with removable controllers and an LCD touchscreen) or be connected to a television when set in its docking station, thus further blurring the distinction between home consoles and handheld consoles. By the end of 2018, the Switch had already sold over thirty-two million units.

Over the past two decades, significant competition to the dedicated handheld gaming market has emerged for the first time because of the confluence of two factors: on the hardware side, the rise of Apple's iPhone as an everyday consumer device, and in software, the establishment of the casual games sector. Online games, often built on Flash or Facebook, have acclimated a new audience previously unfamiliar with games, and these *casual* players are more receptive to games on general-purpose handheld platforms, particularly the iPhone but also Android platform phones and related devices. Nintendo itself has sought to pivot its Nintendo DS brand toward the casual sector with puzzle-oriented titles such as the *Brain Age* (2005) and *Professor Layton* (2007) series. Together, these trends have significantly expanded the scope and market for handheld games. The breakout *Angry Birds* (2009) for iPhone/iPod, based on a simple physics engine, sold more than ten million copies in less than a year, eclipsing typical single-digit-million sales for handheld versions of Nintendo's core franchise games, such as *The Legend of Zelda: Phantom Hourglass* (2007) for DS. For the first time since 1980, the handheld market is not a monopoly but an oligopoly.

Brett Camper

See also: Mobile Games

Further Reading

Herman, Leonard. "Handheld Games." In *The Video Game Explosion: A History from PONG to PlayStation and Beyond*, edited by Mark J. P. Wolf, 143–148. Westport, CT: Greenwood Press, 2007.

Hawkins, Trip (1953–)

Trip Hawkins (William M. Hawkins III) is the founder and CEO of Electronic Arts (EA) and 3DO. He holds a degree in strategy and applied game theory from Harvard as well as an MBA from Stanford University. He was also the first business executive to be inducted into the Academy of Interactive Arts & Sciences Hall of Fame in 2005.

Hawkins began his professional career as the director of strategy and marketing at Apple Computer before founding Amazin' Software in 1982; the company was renamed Electronic Arts in 1983. EA started out as a software publisher and pioneer of the home computer gaming industry. In the early 1980s, EA published software titles such as *Archon* (1983), *M.U.L.E.* (1983), and *The Bard's Tale* (1985). In 1987, EA made the transition to developing software internally with the video game *Skate or Die!* (1987). While heading EA, Hawkins is notable for having innovated the concept of using the likenesses of celebrities and professional athletes in video games, with *One on One: Dr. J v. Larry Bird* (1983) and the original *John Madden Football* (1988) being early examples. EA is also notable for having published the first computer "god game," Bullfrog's *Populous* (1989). Hawkins remained CEO of EA until 1991 and remained its chairman of the board until 1994.

In 1991, Hawkins founded SMSG, Inc., in partnership with several other high-profile companies, including Time Warner, AT&T, MCA, and LG. Hawkins's objective for the company was to create a next-generation CD-ROM-based video game console. The company was later renamed 3DO, and the 3DO Interactive Multiplayer video gaming console was released in 1993. Even though the console had advanced graphics and sound capabilities, the 3DO's high price, lack of third-party development support, and the arrival of the Sony PlayStation in 1994, resulted in relatively poor sales. In 1996, 3DO ceased production of the console and made the transition from being a hardware developer to a video game developer, creating titles for other gaming consoles and the IBM PC, including several well-received franchises: *Battletanx* (1998–99), *Army Men* (1998–2002), *High Heat Baseball* (1999–2003), and *Heroes of Might and Magic* (1996–2003). The company is also notable for publishing the first massively multiplayer online role-playing game (MMORPG), *Meridian 59* (1995). In 2003, due to lack of interest in its software titles, 3DO filed for chapter 11 bankruptcy. Hawkins purchased the rights to some of 3DO's older franchises, while other intellectual properties were sold to rival game developers.

After 3DO's bankruptcy was finalized in 2003, Hawkins founded a new game company, Digital Chocolate, which focused on mobile games and nonentertainment titles for iOS, Android, Facebook, and Microsoft Windows. The company created several successful and award-winning titles, such as *Tower Bloxx* (2005), *Brick Breaker Revolution* (2009), *Galaxy Life* (2011), and *Army Attack* (2012). In May of 2012, Hawkins stepped down as CEO, and the company closed in 2013.

In 2014, Hawkins founded If You Can, a company focused on "edutainment." If You Can's first title, *If* (2014), promotes positive social interaction and emotional intelligence in the classroom.

Aaron D. Boothroyd

See also: Electronic Arts; 3DO Interactive Multiplayer

Further Reading

Ecorner. "Stanford University's Entrepreneurship Corner: Trip Hawkins." Accessed September 13, 2020. Available at https://ecorner.stanford.edu/contributor/trip-hawkins/.

If You Can website. Accessed September 13, 2020. Available at http://www.ifyoucan.org.

HDTV Games

There are four conventional terms used to describe television image definition, standard (480i), enhanced (480p), high definition (720p; 1080i), and full high definition (1080p). The numbers offered in parentheses indicate the quantity of vertical pixels available for display, known as scan lines, whereas the *i* and *p* indicate *interlaced* or *progressive* scan. Interlacing is a practice that originated with cathode-ray tube (CRT) televisions, where an image is constructed by alternating between displaying the odd and even numbered rows. In 1990, well before HDTVs were commercially available, the International Telecommunications Union standardized a new aspect ratio of 16:9 as opposed to the CRT standard of 4:3 to match that of the film industry, in addition to specifying that 1080p would be the standard number of scan lines.

Although HDTV has been around since 1958 (GizMag Team 2009), few storage media could accommodate the rate of data transfer required to display HD. Although public HD broadcasts did emerge in the 1990s, these were rare. However, in 2005, two formats, HD-DVD and Blu-ray, emerged as competing forms of HD discs. Sony, a member of the Blu-ray Disc Association, built its Sony PlayStation 3 to include a Blu-ray player, contributing to an estimated $240 to $307 loss on each unit sold (Fulton 2006). At the time, Blu-ray players sold for more than the retail price of a PS3. This gambit is often attributed as the reason why Blu-ray became the standard format, forcing HD-DVD to fold (Smale 2008). Although the Microsoft Xbox 360 eventually offered HD-DVD compatibility, it came at additional cost to consumers, failed, and was subsequently discontinued. Regardless, the Xbox 360 is capable of outputting in HD and has been said to have stimulated $73 million in HDTV purchases in its first year after launch (Crandall and Sidak 2006).

Two players playing a soccer game on an HDTV screen, in Debrecen, Hungary, on November 19, 2017. (Flowersofsunny/Dreamstime.com)

Several profitable games were remade to display in HD. For example, *God of War* (2005) and *God of War II* (2007), which first appeared in 480p on the Sony PlayStation 2, were rereleased together in 720p just months before *God of War III* (2010) on the PS3. However, smaller titles for platforms can be remade and sold at a lower price, in part because of the online distributing mechanisms of the PlayStation Network and Xbox Live Arcade. Although the competing Nintendo Wii featured remakes of Nintendo's older titles, the console could not display in HD, and consequently the games are usually upgraded from 480i to 480p. Although this made a difference in image quality, it also ensured that the HDTVs would lag less while upscaling their input. Although HDTVs have different native resolutions at which to display images, 480i is not supported and therefore must be processed for upgrading. Some HDTVs feature a game mode that reduces the lag on older games simply by curtailing the upscaling process.

By 2020, TV resolutions had increased to 4K (referring to four thousand pixels), effectively doubling the number of scan lines. Given how taxing this resolution is on a graphics card, consoles continue to target 1080p and 720p quality, at least for now.

William B. A. Robinson

See also: DVD and Blu-Ray Disc Games

Further Reading

Crandall, Robert W., and J. Gregory Sidak. "Video Games: Serious Business for America's Economy." *Entertainment Software Association Report*, 2006. Available at SSRN: http://ssrn.com/abstract=969728.

Fulton, Scott M., III. "PlayStation 3 Loses as Much as $307 per Unit Sold." BetaNews, November 16, 2006. Available at http://www.betanews.com/article/PlayStation-3-Loses-as-Much-as-307-Per-Unit-Sold/1163688668.

GizMag Team. "Teleavia Type P111—High Definition TV circa 1958." *Gizmag.com*, October 4, 2009. Available at https://newatlas.com/teleavia-type-p111-high-definition-tv-1958/13026/.

Smale, Will. "How the PS3 Led Blu-Ray's Triumph." BBC News, February 19, 2008. Available at http://news.bbc.co.uk/2/hi/business/7252506.stm.

Health (Mental)

With the popularity of video games constantly increasing, many are exploring the impact they have on mental health. Psychological well-being encompasses cognitive, behavioral, emotional, and physical aspects of health. The Ryff scales of psychological well-being include establishing positive relationships, employing effective coping skills, possessing self-acceptance, demonstrating independent thoughts and behaviors, identifying purpose in life, and working toward continued personal development (Ryff and Keyes 1995). Bradburn's (1969) notion of psychological well-being focuses on aspects of positive and negative affect, or subjective emotional experiences. Higher levels of psychological well-being are directly connected to happiness and elevated quality of life.

Smyth (2007) examined arcade games, console-based games, computer games, and massive multiplayer online role-playing games (MMORPGs) with factors of well-being. Results indicated that MMORPGs were associated with highest number of hours played and lowest levels of sleep quality, academic performance, overall health, and social life. However, overall levels of well-being were nearly equal among the four groups. Chen (2008) suggested online games may be used to enhance satisfaction with life if individual personality characteristics are taken into consideration by game providers. You, Kim, and No (2015) found that empathy and behavioral self-control mediated the relationship between playing violent video games and prosocial behavior. Kovess-Masfety et al. (2016) found video game play was not related to mental health problems and may be linked to positive intellectual functioning. Ryan, Rigby, and Przybylski (2006) indicated that the relationship between video games and well-being is complex. Mere exposure to video games was not related to positive or negative affect. Yet, those individuals who felt competence and autonomy while playing video games experienced higher levels of enjoyment, self-esteem, and positive affect. Conversely, gaming was related to fatigue and had a negative impact on measures of vitality.

Perceptions of abnormality are largely connected to culture and societal norms. Guidelines for determining whether behavior is abnormal include evaluating whether the behavior falls outside of what is considered *normal* within a particular society, whether the behavior interferes with aspects of daily life, and whether the behavior is long lasting or persistent (Meyer, Chapman, and Weaver 2009). A psychologist may deem video game play as abnormal if it interferes with work or school performance. In addition, if video game play affects physical health (see "Health [Physical]") or social/familial relationships the behavior may be considered outside of the normal range. Lastly, a problematic pattern of video game play must be observable, for example, for at least six to twelve months.

The fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-5*; APA 2013) is the reference that the fields of psychiatry and psychology use to categorize mental illness and diagnoses. Its conceptualization of mental health is based on research on mental illness with respect to causes, features, and treatment. The *DSM-5* acknowledges the multidimensional nature of mental health in its diagnostic assessment format, as it recognizes cognitive, behavioral, emotional, environmental, and physical factors that contribute to mental health. Researchers have applied *DSM* diagnostic criteria for substance dependence and pathological gambling to assess problematic video game playing (e.g., Tejeiro-Salguero and Bersabé-Morán 2002). Internet gaming disorder (IGD) is included in the *DSM-5* as a condition warranting more clinical research and exploration before it is included as a formal diagnosis (APA 2013). Cho and colleagues (2014) developed the standardized, self-diagnostic internet addiction scale based on the *DSM-5* IGD criteria. Kuss, Griffiths, and Pontes (2017) indicate IGD criteria is too vague and call for more research to reach a consensus for diagnostic criteria so individuals can receive useful treatment. Deleuze et al. (2017) purport IGD criteria is unable to distinguish between high engagement and pathological involvement of gamers. Van Rooij, Schoenmakers, and van de Mheen (2017) created a clinical assessment tool (C-VAT 2.0) to assess the validity of the *DSM-5* IGD criteria and provide a common means to address improvements.

There are numerous ways to improve mental health and enhance psychological well-being. Prevention techniques such as psychoeducation can be effective with healthy populations or populations at risk for developing problems. Psychoeducation includes teaching individuals about psychological concepts and effective coping strategies to foster healthy, happy living. For example, video games can be used to support learning (Freitas 2006) and may enhance spatial abilities in females (Terlecki and Newcombe 2005). A video game–based intervention has been successful in promoting active aging with respect to physical, emotional, and social health (Vázquez et al. 2018). Psychotherapy can be used as prevention as well as a tool to work through current mental health issues or to maintain quality of life while living with chronic mental illness. Psychotherapy with a counselor may include focusing on thoughts, feelings, self-exploration, examination of past experiences, or learning new ways to deal with problems. Video games have been used to treat anxiety disorders such as phobias (Walshe et al. 2003) and traumatic brain injuries (Ustinova et al. 2014). Also, social support, or building relationships with others, may improve psychological well-being. Longman, O'Connor, and Obst (2009) suggested *World of Warcraft* (2004) may foster social support. Low levels of *WoW* play may increase well-being with respect to symptoms of depression, anxiety, or stress.

Rachel F. Pickett

See also: Psychological Research on Video Games; Virtual Reality

Further Reading

American Psychiatric Association (APA). *Diagnostic and Statistical Manual of Mental Disorders: DSM-5*. 5th ed. Washington, DC: American Psychiatric Association, 2013.

Bradburn, N. M. *The Structure of Psychological Well-Being*. Chicago: Adline Pub. Co., 1969.

Chen, L. S. L. "Subjective Well-Being: Evidence from the Different Personality Traits of Online Game Teenager Players." *CyberPsychology & Behavior* 11, no. 5 (2008): 579–581. Available at https://doi.org/10.1089/cpb.2007.0192.

Cho, H., M. Kwon, J. Choi, S. Lee, J. Choi, S. Choi, and D. Kim. "Development of the Internet Addiction Scale Based on the Internet Gaming Disorder Criteria Suggested in DSM-5." *Addictive Behaviors* 39, no. 9 (2014): 1361–1366. Available at https://doi.org/10.1016/j.addbeh.2014.01.020.

Deleuze, J., F. Nuyens, L. Rochat, S. Rothen, P. Maurage, and J. Billieux. "Established Risk Factors for Addiction Fail to Discriminate between Healthy Gamers and Gamers Endorsing DSM-5 Internet Gaming Disorder." *Journal of Behavioral Addictions* 6, no. 4 (2017): 516–524. Available at https://doi.org/10.1556/2006.6.2017.074.

Freitas, S. I. de. "Using Games and Simulations for Supporting Learning." *Learning, Media and Technology* 31, no. 4 (2006): 343–358. Available at https://doi.org/10.1080/17439880601021967.

Kovess-Masfety, V., K. Keyes, A. Hamilton, G. Hanson, A. Bitfoi, D. Golitz, . . . O. Pez. "Is Time Spent Playing Video Games Associated with Mental Health, Cognitive and Social Skills in Young Children?" *Social Psychiatry and Psychiatric Epidemiology* 51, no. 3 (2016): 349–357. Available at https://doi.org/10.1007/s00127-016-1179-6.

Kuss, D., M. Griffiths, and H. Pontes. "Chaos and Confusion in DSM-5 Diagnosis of Internet Gaming Disorder: Issues, Concerns, and Recommendations for Clarity in the Field." *Journal of Behavioral Addictions* 6, no. 2 (2017): 103–109. Available at https://doi.org/10.1556/2006.5.2016.062.

Longman, H., E. O'Connor, and P. Obst. "The Effect of Social Support Derived from World of Warcraft on Negative Psychological Symptoms." *CyberPsychology & Behavior* 12, no. 5 (2009): 563–566. Available at https://doi.org/10.1089/cpb.2009.0001.

Meyer, R. G., L. K. Chapman, and C. M. Weaver. *Case Studies in Abnormal Behavior*. 8th ed. Boston: Pearson/Allyn & Bacon, 2009.

Rooij, A. van, T. Schoenmakers, and D. van de Mheen. "Clinical Validation of the C-VAT 2.0 Assessment Tool for Gaming Disorder: A Sensitivity Analysis of the Proposed DSM-5 Criteria and the Clinical Characteristics of Young Patients with 'Video Game Addiction.'" *Addictive Behaviors* 64(C) (2017): 269–274. Available at https://doi.org/10.1016/j.addbeh.2015.10.018.

Ryan, R. M., C. S. Rigby, and A. Przybylski. "The Motivation Pull of Video Games: A Self-Determination Theory Approach." *Motiv Emot* 30 (2006): 347–363. Available at https://doi.org/10.1007/s11031-006-9051-8.

Ryff, C., and C. Keyes. "The Structure of Psychological Well-Being Revisited." *Journal of Personality and Social Psychology* 69 (1995): 719–727.

Smyth, J. M. "Beyond Self-Selection in Video Game Play: An Experimental Examination of Consequences of Massively Multiplayer Online Role-Playing Game Play." *CyberPsychology & Behavior* 10, no. 5 (2007): 717–721. Available at https://doi.org/10.1089/cpb.2007.9963.

Tejeiro-Salguero, R. A., and R. M. Bersabé-Morán. "Measuring Problem Video Game Playing in Adolescents." *Addiction* 97 (2002): 1601–1606.

Terlecki, M. S., and N. S. Newcombe. "How Important Is the Digital Divide? The Relation of Computer and Videogame Usage to Gender Differences in Mental Rotation Ability." *Sex Roles* 53 (2005): 433–441. Available at https://doi.org/10.1007/s11199-005-6765-0.

Ustinova, K., J. Perkins, W. Leonard, and C. Hausbeck. "Virtual Reality Game-Based Therapy for Treatment of Postural and Co-Ordination Abnormalities Secondary to TBI: A Pilot Study." *Brain Injury* 28, no. 4 (2014): 486–495. Available at https://doi.org/10.3109/02699052.2014.888593.

Vázquez, F., P. Otero, J. García-Casal, V. Blanco, Á. Torres, and M. Arrojo. "Efficacy of Video Game–Based Interventions for Active Aging. A Systematic Literature Review and Meta-Analysis." *PloS One* 13, no. 12 (2018): 1–24. Available at https://doi.org/10.1371/journal.pone.0208192.

Walshe, D. G., E. J. Lewis, S. I. Kim, K. O'Sullivan, and B. K. Wiederhold. "Exploring the Use of Computer Games and Virtual Reality in Exposure Therapy for Fear of Driving Following a Motor Vehicle Accident." *CyberPsychology & Behavior* 6 (2003): 329–334.

You, S., E. Kim, and U. No. "Impact of Violent Video Games on the Social Behaviors of Adolescents: The Mediating Role of Emotional Competence." *School Psychology International* 36, no. 1 (2015): 94–111. Available at https://doi.org/10.1177/0143034314562921.

Health (Physical)

In their early days, home video games were accused of promoting a sedentary lifestyle (players usually stood while playing arcade games, but this fact was not noted, and arcade games were not defended as being any healthier than home video games). The argument was that video games kept players from participating in more vigorous activities, such as sports, and that video game sports were poor replacements for the physical activities they represented. What was worse, the activity they did require, such as wrist movements and button pressing, sometimes led to repetitive stress injuries (RSI) that were even given such names as "Space Invader wrist" and "gamer's thumb." Such specialized injuries or disorders continue to emerge, and more recently one can find mentions of "Wii-itis," "Wii elbow" (similar to tennis elbow), and "PlayStation palmar hidradentitis," a skin pathology that includes painful lesions on the palm and fingers.

In addition to such specific injuries, video games were blamed for causing headaches, eyestrain, epileptic seizures (due to flashing screens), carpal tunnel (common to other computer users as well), nerve damage caused by vibrating haptic controllers (e.g., Nintendo's Rumble Pak), fatigue, and lack of sleep due to excessive online activity. Clearly, most of these ailments were due to excessive and prolonged use of video games and more the result of players' use (or abuse) than of video game design or hardware design. Such overuse also led to questions regarding video game addiction and other effects on mental health (see "Health [Mental]"). With proper levels of use; however, such effects are no more present than they are with other computer technologies or physically manipulated hardware.

During the late 1990s and early 2000s, some games and game series were designed to challenge the sedentary image that video games had acquired, the most widely known one being Konami's *Dance Dance Revolution* game series, which has even been used in high school physical education classes as an activity. In 2006, the Nintendo Wii, with its gestural interface, also introduced games requiring large-scale bodily movement on the part of its players. Although its *Wii Sports* and *Wii Play* games make players move around (even giving players warnings suggesting they take a break after the system has been in use for a while), the game *Wii Fit* (2007), with its balance board, combined exercise and entertainment.

Video games have already been used to help people overcome phobias (see "Virtual Reality"), and hospitals have used the Wii as a therapeutic tool in rehabilitation and physical therapy routines for patients recovering from illnesses, strokes, accidents, and combat injuries. Besides encouraging exercise, video games can also help players question unhealthy eating habits, such as Ian Bogost's online game *Fatworld* (2007), which examines the U.S. obesity epidemic.

As more of these aspects are addressed by video game hardware designers and as newer games and game systems continue to incorporate new types of interfaces (with the mainstream 3-D motion-tracking Microsoft Kinect, augmented reality [AR], and virtual reality [VR]), the overlap between medicine and video games will continue to be a fruitful area of research and one that may find ways to improve the health and well-being of video game players. Projects such as Games for Health (https://www.gamesforhealtheurope.org)—which wants to help foster and support the community that uses video games, game technologies, and game development talent to find new ways to improve the management, quality, and provision of health care worldwide—are already working in this direction.

Mark J. P. Wolf and Bernard Perron

See also: Health (Mental)

Further Reading

Games for Health Journal. Accessed September 13, 2020. Available at https://www.liebertpub.com/loi/g4h.

Games for Health website. Accessed September 13, 2020. Available at https://www.gamesforhealtheurope.org.

Primack, Brian A., et al. "Role of Video Games in Improving Health-Related Outcomes: A Systematic Review." *American Journal of Preventative Medicine* 42, no. 6 (June 2012): 630–638.

Heineman, Rebecca (1963–)

Rebecca Heineman is an American video game designer and programmer who has contributed to more than 250 games. Heineman first learned to code with an AMES 65 kit computer and later by playing around with an Apple II and an Atari 2600. While experimenting with both hardware and software, Heineman started to reverse engineer the code for their games.

As a self-taught coder, it was Heineman's winning of the National *Space Invaders* Championship held by Atari in 1980—which had ten thousand competitors and was one of the first large-scale gaming competitions—that helped launch Heineman's career in the video game industry. Following this, Heineman consulted on Tom Hirschfeld's book *How to Master the Video Games* (1981) and was hired by *Electronic Games* magazine to write a series of articles about Easter eggs. During this time, a magazine publisher arranged a meeting between Heineman and the owners of Avalon Hill after hearing about the reverse-engineered Atari 2600 code.

That meeting led to Heineman's first job as a game developer, working at Avalon Hill. After leaving Avalon, Heineman worked at Boone Corporation before helping found Interplay Productions (later Interplay Entertainment) in 1983. The strength of Interplay, explains Heineman, is that the company constantly took risks, launching such titles as *Tass Times in Tonetown* (1986), *Clay Fighter* (1993), and *Earthworm Jim* (1994). Yet, these risks are what eventually drove the company to close.

Heineman next moved into CEO roles, first as cofounder of Logicware in 1995, publishing Mac games, before starting the game company Contraband Entertainment in 1999. Contraband was acquired by Olde Sküül in 2013. Heineman is best known for work on *Tales of the Unknown: Volume I* (otherwise known as *The Bard's Tale* [1985]), *The Bard's Tale III* (1988), *Wasteland* (1988), and *Dragon Wars* (1989). Throughout, Heineman developed a reputation for meticulous design, advanced computer skills, and the large catalog of games converted to Apple IIGS, Macintosh, and other platforms.

Heineman has stayed active in game development through consultancy and contract work for such companies as Electronic Arts (EA), Ubisoft, Barking Lizards Technology, Microsoft, and Amazon, among others, working on software architecture, engine development, motion capture, and design work.

In recent interviews, Heineman sees the creative potential in independent game development and notes that the business of games ensures that people working for major companies are risk averse because failure means losing a job. Thus, the launching of a failing *Fast and Furious* game can be blamed on a tired IP rather than on bad game design or too many cutscene-based narratives. On the other hand, Heineman looks to games such as *Portal* (2007), *World of Goo* (2008), and *Minecraft* (2009) to see what small teams and gamecentric design can provide players in terms of innovation and unique experiences.

In addition to working in game development, Heineman is an advocate for LGBTQ+ rights and representation, both as the transgender chair for Glamazon, Amazon's LGBTQ+ group, and also as a board member of GLAAD. Heineman knows what it is to feel excluded because of normative practices vis-à-vis gender identities, and no longer promotes the nickname "Burger Becky" from earlier years, instead asking to be called "Burger" as a means of avoiding gendered naming conventions.

In 2017, Rebecca Heineman was inducted into the International Video Game Hall of Fame.

Jennifer deWinter and Carly A. Kocurek

See also: Electronic Arts

Further Reading

Barton, Matt. "The Burger Speaks: An Interview." Gamasutra, December 27, 2010. Available at https://www.gamasutra.com/view/feature/134614/the_burger_speaks_an_interview_php.

Help Function

The help function encompasses a variety of design strategies that seek to assist users in their progress throughout interactive experiences. It can be provided by objects surrounding the game—such as cabinets, game cases, or game manuals—or by the software itself. Software-based help can go beyond a purely static presentation and be integrated dynamically or covertly throughout the experience.

TUTORING THE PLAYER

As many scholars have pointed out, the interactive nature of video games allows users to learn how to play as the system operates. Clarity of rules is also frequently put forward in definitions of the medium, and most video games provide overt instructions to facilitate immersion. In the case of early arcade games, simple designs could be communicated through a few directives displayed on the screen or on the cabinet itself. For instance, *PONG* (1972) instructed players to "avoid missing ball for high score," and *Donkey Kong*'s cabinet (1981) stated in a trivial/comical manner, "Jump button makes Jumpman jump." The *Galaga* (1981) and *Zaxxon* (1982) cabinets used a combination of written instructions and color images to explain the introduction of novel mechanics in the shooting game genre (the "ship recovery" mechanic and the altitude variation system, respectively). Information redundancy between the printed instructions and the attract mode of the game is also a common strategy; in *Berzerk* (1980) and *Zaxxon*, for instance, the short on-screen demonstrations echo the written directives.

Considering the complexity of specific genres, such as role-playing games (RPGs), it became increasingly difficult to limit tutoring to the periphery of the game. Dungeons & Dragons–inspired games such as the *Ultima* series or the *Phantasie* series provided voluminous instruction manuals detailing the numerous commands, objects, and enemies to be found in their expansive worlds. In the action RPG *Gauntlet* (1985), early levels were created as interactive tutorials that sought to acquaint players with this newfound complexity; to properly introduce major new elements, the game paused and provided textual instructions that were also spoken by a synthetic voice (e.g., "Save potions for later use"). Overt tutoring within early levels that were specifically designed to facilitate the assimilation of mechanics have rapidly become the norm in video game design. The open-ended nature of early computer RPGs and other genres made it harder to implement this strategy, but guidance for the appropriate challenges were often provided by alternative means; for instance, the manual for the *Bard's Tale* (1985) specified which dungeons should be explored first. In more recent examples, such as *The Elder Scrolls IV: Oblivion* (2006), players are forced to complete the first dungeon before exploring the vastness of Tamriel on their own.

To further assist players, designers could provide additional information on the system's inner workings. In the arcade, these hints—as they were most commonly labeled—often pertained to the possibility of maximizing one's score but could also explain valuable gameplay strategies. The *Battlezone* (1980) cabinet, for instance, recommended to "use the radar, keep moving, use the cubes and pyramids as shields, listen for the enemy's tank shots." The manuals or leaflets that came with the home versions of popular arcade titles usually proposed additional tips and strategies. The lengthy manuals provided for *Phantasie* (1985), *Gemstone Warrior* (1984), and many other RPGs had hints for gameplay scattered throughout them. Some games allowed players to request instructions or hints during gameplay. Mike Edwards's *Zombies* (1983) featured "online" help screens at the player's request, and in the interactive fictions of the *SaGa* series, users could type "HELP" on the text parser in the hope of receiving some assistance. Adventure games such as *Martian Memorandum* (1991) and *Roberta William's Phantasmagoria* (1995) featured built-in hint systems. In more recent outings, the on demand nature of hints has been partially automated: *Infamous* (2009) and *Batman: Arkham Asylum* (2009) provide textual hints when players face certain new challenges or appear to be struggling. This assistance often takes the shape of a reminder of a tutorial element.

MANAGING THE PERFORMANCE

On top of tutorials and hint systems, game designers have developed another major strategy to assist players: the possibility to evaluate and control the difficulty of the challenge to some extent. For domestic releases, users could rely on ratings provided on game boxes. Epyx games, for instance, were rated with three icons (action, strategy, and learning), and the side of the boxes for SSI games specified both the difficulty level and the estimated play time. Since the economic model of the arcade relied on a constant flow of quarters, adjustable difficulty made more sense for domestic systems. On the Atari VCS 2600, one could find switches labeled "game select" and "difficulty" that afforded easy access to multiple game variations. For instance, these switches allowed players to adjust the size of the laser cannon in the VCS version of *Space Invaders* (arcade version, 1978; VCS version, 1980). Still, many arcade games did offer adjustable difficulty settings: in *Tempest* (1980) and *Star Wars* (1983), players could sacrifice a generous score bonus to begin at easier waves. Adjustment of challenges could also be made covertly. According to Ernest Adams (2008), dynamic difficulty adjustment emerged as early as 1981 with *Astrosmash* (1981); the *Asteroids* (1979) clone lowered its difficulty automatically when players only had one life left. Contemporary games such as *Left 4 Dead* (2008) have developed complex "AI director" algorithms that evaluate players' performance and adjust the challenge accordingly.

The pause function also made more sense in the domestic context. Arcade game makers were more concerned about players ending their sessions quickly, hence the presence of timers and "pushing hands," such as Evil Otto in *Berzerk*. In 1976, the Fairchild Channel F home console already featured a dedicated pause button; home computer games also integrated the function early on through the spacebar or the *P* key. Of course, turn-based games (e.g., *Roadwar 2000* [1986] and *Dragon Warrior* [1986]) integrated pauses during combat sequences to facilitate strategic planning. As games became lengthier, game developers introduced other ways to manage the experience. Many arcade games in the 1980s offered the possibility of continuing from a checkpoint, a feature that was presented as unique on the *Moon Patrol* home conversion for the Atari 5200 (arcade version, 1982; 5200 version, 1983). However, save systems were already implemented in many adventure games (*Adventureland* [1978]), strategy games (*Invasion Orion* [1979]), and RPGs (*Ultima* [1980]) thanks to rewritable media. Early cartridge games allowed players to continue by using alphanumeric codes provided at the end of a session (e.g., in the *Mega Man* series on the Nintendo Entertainment System [NES]), and battery-powered solutions rapidly emerged (*The Legend of Zelda* [1986]). Contemporary game design has automated the game saving function to a large extent, with frequent checkpoints or tacit save states. All these features provide assistance by salvaging players' efforts and giving them more control over the pacing of the experience.

Carl Therrien

Further Reading

Adams, Ernest. "The Designer's Notebook: Difficulty Modes and Dynamic Difficulty Adjustment." Gamasutra, May 14, 2008. Available at https://www.gamasutra.com/view/feature/132061/the_designers_notebook_php.

Ang, Dennis. "Difficulty in Video Games: Understanding the Effects of Dynamic Difficulty Adjustment in Video Games on Player Experience." In *Proceedings of the 2017 ACM SIGCHI Conference on Creativity and Cognition*, Singapore, June 27–30, 2017: 544–550.

Juul, Jesper. *A Casual Revolution: Reinventing Video Games and Their Players*. Cambridge, MA: MIT Press, 2009.

Schweizer, Bobby. "Difficulty." In *Debugging Game History*, edited by Henry Lowood and Raiford Guins, 109–118. Cambridge, MA: MIT Press, 2016.

Therrien, Carl. "From the Deceptively Simple to the Pleasurably Complex. The Rise of the Cooperative Address in the History of Video Games." In *The Handbook of Digital Games*, edited by Harry Agius and Marios Angelides, 548–574. Piscataway, NJ: IEEE Press, 2014.

Hip-Hop

The term *hip-hop* refers to both a style of music and a larger subcultural mode of expression. Musically, hip-hop usually includes the art of emceeing or rapping in rhyme or verse over beats that are synthesized with a combination of sampled music, live music, beat-boxing, sound effects, drum machines, or singing. Culturally, hip-hop can be thought of as including b-boy (break) dancing, graffiti art, and political and philosophical perspectives that are most often associated with the social advancement of minority youth.

Like gaming, hip-hop has become a global cultural phenomenon, and the hip-hop industry's formative years of growth, rise in mainstream popularity, and product diversification mirror the early years of console and arcade gaming in notable ways. Because hip-hop originated in the South Bronx of New York City in the 1970s (during the key years of the rise in popularity of arcade and console gaming), technological advancements in the areas of electronic music, computer hardware, sound and video chips, and the distribution of portable devices simultaneously affected both industries. A number of hip-hop legends, such as the members of the Wu-Tang Clan, describe themselves not only as being well versed in the technological innovations of the times but also as participating in the evolving gaming scenes of the 1970s and 1980s, so there was always a relationship between producers of hip-hop music and gaming communities.

Since the 1970s and 1980s, the creators of hip-hop music and the world of gaming fandom have most often collided at the level of sound engineering. In this regard, a good number of hip-hop artists have paid homage to their lives as gamers in their music. In these songs, the lyrics range from brief shout-outs about individual game franchises to longer narrative commentaries on games, classic systems, and the nostalgic memories of particular gaming eras. Jean Grae, Pharrell, Del the Funkee Homosapian, Biggie Smalls, MC Lars, Eminem, and a seemingly endless number of both mainstream and underground emcees have rhymed about video games in their music to varying degrees of commercial success and recognition. In this vein, the connection to hip-hop and video games is often used to emphasize both material and creative successes. For instance, hip-hop legend Biggie Smalls famously rapped in his first hit "Juicy" (1994), "Super Nintendo, SEGA Genesis / When I was dead broke, man, I couldn't picture this." In the context of the song, which is about Smalls finally ascending despite his doubters, his acquisition of the era's leading video game systems is most clearly a technological and material accomplishment of which he can be proud.

In other cases, artists such as Beanie Sigel in "Mac Man," Bone Thug and Harmony in "Eternal," and Tonedeff in "Round 'Em Up" (songs that sample *Ms. Pac-Man* [1981], *Eternal Champions* [1993], and *Kid Icarus* [1986], respectively) have integrated portions of video game theme songs into their tracks to create a sound fusion of rap and the techno-heavy, tinny, or 8-bit sound effects of most classic or retro game beats. As one example of this type of fusion of sounds, Random's entire *Mega Ran* (2007) album pays homage to his "love affair" with Nintendo's hit *Mega Man* (1987). The song "Splash Woman" includes gaming references in both the lyrics and in the sampled beats as Random raps a lengthy serenade to the game's female robot and her challenging "boss battle." Random narrates, "I was breezin, battlin bosses / The record is flawless, zero losses." The techno electronic beats of the game's level music combined with a heavy hip-hop bass downbeat and Random's rapping and alternating singing give it an eclectic and hardcore aesthetic—both in terms of its sound and production values and in terms of Random's credibility as a gamer. In this vein, there are also albums that are multiartist compilations of rap songs that reference or sample video games, including the cult favorite albums *Game Over* (2000) and *Game Over 2* (2001).

The two industries have also intersected in the area of game design, where developers of music, graffiti, and fighting games have attempted to capitalize on the continued popularity of hip-hop music with gaming audiences. Rhythm and dance games most obviously demonstrate hip-hop's relevance to the gaming industry, and games such as *Parappa the Rappa* (1996), *Get on Da Mic* (2004), the *MTV Music Generator* series (1999–2004), and *DJ Hero* (2009–10) give gamers a chance to flex their own musical prowess as they emulate the art of rapping, scratching, and deejaying on cue. More recently, *Def Jam Rapstar* (2010) uses voice recognition technology and microphone controllers to try to measure intonation, accurate rhythmic mimicry, and flow. Other elements of hip-hop culture, such as tagging, graffiti art, and break dancing, have been featured in a number of nonmusic game titles, most notable among these are *Break Dance* (1984), *Marc Ecko's Getting Up: Contents under Pressure* (2006), *Jet Grind Radio* (2000), *Jet Set Future Radio* (2002), and *B-Boy* (2006). Hip-hop-inspired fighting games, such as *Wu-Tang: Shaolin Style* (1999), the long-running *Def Jam* wrestling series (2003–11), and *Afro Samurai* (2009), often feature rappers as characters and require gamers to coordinate a variety of combos, special moves, and acrobatic jumps with a pulsing soundtrack of licensed rap music.

A number of controversial action games—namely, *Grand Theft Auto: San Andreas* (2004), *50 Cent: Bulletproof* (2005), *Saints Row* (2006), and *Saints Row 2* (2008)—have also capitalized on the widespread consumer interest in hip-hop culture by featuring an "urban" setting. These titles' visual style, stories, plots, character costumes, and character development often contain direct allusions to hip-hop legends from the past. Contemporary rappers often participate in urban action games by delivering voice acting performances that attempt to further lend the titles credibility with the growing demographic of gamers who are also fans of hip-hop music and culture. The criticism of these games mirrors critiques of some mainstream rap, with opponents stressing that the collaborations seem to glorify crime, violence, and misogyny. However, others would say that such content does not accurately reflect the totality of what hip-hop stands for; rather, the tendency to equate hip-hop with violence and crime (in video games and music) only reflects how the culture is often misappropriated for profit.

Using video game soundtracks for in-game advertising illustrates an additional way in which the video game and hip-hop industries have proven invaluable to each other in recent years. Games across genres—but especially sports games—have consistently used the latest tracks from hip-hop and rap artists to create a contemporary sonic aesthetic for everything from the *Madden* series, to most basketball franchises (*2K NBA*, *NBA Street*, *NBA Ballers*), to racing games such as the *Need for Speed* series, to golf simulators. Music artists, from the Roots and Kid Cudi to T.I. and Snoop Dog, have viewed games as another way to distribute their music and gain new fans.

This mix of distribution, promotion, and cross-marketing is further complicated by the fact of media conglomeration in the global marketplace. For example, Viacom, Sony, Time Warner, and other conglomerates now include game hardware manufacturers, game distributors, and game producers as well as music artists, record labels, and music television networks (e.g., MTV, VH1, and BET) as assets in their financial portfolios. Such media conglomerations have a vested interest in sustaining the connection between gaming and hip-hop because it is becoming more possible for a single conglomerate to own the rights to a song, the game in which it appears, and the system on which it is being played. As sales in traditional music distribution decline while video game sales garner more and more of the consumer market share, video games are likely to continue to be important to hip-hop artists, to their fans, and to the corporations that profit from all of the above.

The creative and commercial synergies between hip-hop and video games will no doubt continue as artists and fans of both industries continue to pursue overlapping interests in an increasingly globalized consumer economy. Four of the five main elements of hip-hop have long been a part of video game culture. For example, in games, we have seen the use and display of deejaying (sound mixing, sampling, remediation), emceeing (poetics, voice, rap), break dance (body, movement, style), and graffiti (visuality, expression, color). Only hip-hop's hardest to commodify principle—knowledge (of self, social change, protest)—remains absent from gaming culture.

TreaAndrea M. Russworm

See also: Music

Further Reading

Chang, Jeff, and D. J. Kool Herc. *Can't Stop Won't Stop: A History of the Hip-Hop*

Generation. New York: Picador, 2005.

Forman, Murray, and Mark Anthony Neal. *That's the Joint!: The Hip-Hop Studies Reader*. 2nd ed. New York: Routledge, 2011.

Rose, Tricia. *The Hip Hop Wars: What We Talk About When We Talk About Hip Hop—And Why It Matters*. New York: Basic Civitas Books, 2008.

RZA, The, and Chris Norris. *The Wu-Tang Manual*. 1st ed. New York: Riverhead Books, 2004.

History of Video Games

The history of video games began around the mid-twentieth century, and although it had a relatively slow start, the development of video games sped up considerably after they became a commercial product in the early 1970s, and a decade after that, they became a formidable cultural force. The history of video games has made an impact on the history of all other contemporary media and is central to the history of public computing because arcade video games and home game consoles were often the first computers used and purchased by consumers. They also introduced the computer into the public arena, and they were the first form of electronic interactive audiovisual entertainment.

EARLY EXPERIMENTS

The idea for video games can be traced back to 1947, with the filing of patent #2,455,992, which described an interactive game played on a cathode-ray tube; however, an actual working video game did not appear until sometime later. Although there is some debate as to what should be considered the "first" video game, which also depends on the definition of *video* and *game*, the early mainframe games are usually the first to qualify, with *Spacewar!* (1962) often considered the first complete game by today's standards. Mainframe games were mostly found in university laboratories, and the first communities of game players and programmers formed around them. The development of such games continued into the 1970s and also included the first online games.

In 1966, inventor Ralph H. Baer, looking for a new use for television sets, began developing his Brown Box series of experiments at Sanders Associates. The series of prototypes he produced would lead to the first home video game console, the Magnavox Odyssey, in 1972. The Odyssey included twelve built-in games, along with colored screen overlays, playing cards, and dice. New versions of the Odyssey continued to appear until 1978. Although home games were developing, Stanford University graduate Bill Pitts and his friend Hugh Tuck were working on a coin-operated version of *Spacewar!*, which resulted in *Galaxy Game* (1971), the first coin-operated video game, which was installed in Stanford's student union. The first mass-produced coin-operated video game, however, appeared a month later, Nolan Bushnell and Ted Dabney's *Computer Space* (1971), which was also based on *Spacewar!*

AN INDUSTRY BEGINS

Bushnell went on to found Atari, and the company's first game was *PONG* (1972). In the years that followed, more arcade games and home game systems appeared, many of which were ball-and-paddle games. In 1976, General Instruments released the AY-3-8500 chip, which included all the components needed to make a ball-and-paddle game, encouraging their production. The market flooded with these games as their novelty faded, eventually leading the video game industry to the crash of 1977. The industry recovered quickly, however, largely thanks to the appearance of programmable video game consoles that used cartridges instead of having all of their games built-in. The first such system was the Fairchild/Zircon Channel F in 1976, which was soon overshadowed by the Atari VCS 2600 released in 1977. In the years that followed, several hundred games would appear for the 2600, including ports of Atari's arcade games and a large number of original games designed for the system, many of which were made by third-party developers. Following Atari's success, other home systems appeared, including the Coleco Telstar in 1978, the Mattel Intellivision in 1979, the ColecoVision in 1982, and the Atari 5200 in 1982.

Arcade games also saw a new technology in 1977. Vector games, which drew their images on-screen line by line instead of by full-screen raster scanning, appeared and were produced during the late 1970s and early 1980s by companies such as Cinematronics, Vectorbeam, and Atari, and one vector-based home console system appeared in 1982, the GCE/Milton Bradley Vectrex. Notable vector games included *Speed Freak* (1978), *Warrior* (1979), *Asteroids* (1979), *Battlezone* (1980), and *Tempest* (1981). Vector games would be the first to present computationally true three-dimensional graphics to video games.

The late 1970s and 1980s also saw the rise of the home computer and computer games, which gave many people a reason to buy a computer. Computers and video games were also being exported to Europe, Asia, Australia, and New Zealand, and indigenous production of games and systems in these areas also began around this time. This interest in video games around the world served to open up foreign markets even further; for example, Nintendo's first venture into video games was distributing the Magnavox Odyssey in Japan in 1974, and the next year it produced its first arcade game, *EVR Race* (1975).

Video games became a force in popular culture as their popularity increased, with some games, such as *Space Invaders* (1978), *Pac-Man* (1980), and *Defender* (1980), succeeding internationally and taking in hundreds of millions of dollars. By 1982, arcade video games had reached their peak, with about ten thousand arcades in operation in the United States alone (Wolf 2007, 105). However, the arcade and the home market were growing more competitive and were saturated with cheap imitations of successful games, and video games' novelty was waning, making another industry crash imminent.

THE GREAT CRASH AND RECOVERY

Warning signs appeared as arcade profits fell in late 1982, and the North American home market collapsed, leading to the great video game industry crash of 1983. Thousands of arcades closed, and almost no new home systems appeared on the market. Mattel, which had once been the third-largest producer of games, and its Intellivision system left the market. The arcade industry was looking for a new technology to revive the market and briefly pinned its hopes on laserdisc games; these provided better graphics, which were stored as video clips on laserdiscs. Limiting games to the clips and the graphics sometimes placed over them reduced interactivity, and because of the technology, laserdisc games often cost twice as much as other arcade games, resulting in their failure overall. Rick Dyer's Halcyon, a laserdisc-based home game system, also appeared in early 1985, but its high price and limited game library led to its failure. But no new console systems appeared in 1984, as the American video game industry waited to see what would happen. Video games' novelty had worn off, the golden age of arcade games was over, and no one knew how long it would be until the industry bounced back, or even if it would.

The crash finally ended in 1985 when a new system advanced home video games to a new level and revived consumer interest. The Nintendo Entertainment System (NES) was already a success in Japan, where it had been released in 1983 as the Nintendo Famicom. The NES was an 8-bit system, making it more advanced than any of its predecessors, and Nintendo allayed retailers' hesitance to stock another video game console by promising to buy back unsold systems. The system was a success, the NES soon had a large library of games, and Nintendo was more careful than Atari had been when it came to third-party licensing.

During the early 1980s, the home computer market was also expanding, with the release of such machines as the IBM PC, Commodore VIC-20, and the Xerox Star in 1981; the Commodore 64 in 1982; the Apple IIe and the Apple Lisa in 1983; and the Apple Macintosh and Tandy 1000 in 1984. With their first appearance in the 1970s, home computers provided a new venue for games. Many computers were purchased for their gameplaying abilities, and the two industries overlapped each other. Atari produced its own line of home computers, and some computer systems, such as Texas Instruments' TI-99/4a, had slots for game cartridges built into them. Home computers also allowed hobbyists to write and exchange their own homebrew games, and some, such as programmer Richard Garriott, creator of the *Ultima* series, went on to sell thousands of games and start their own companies.

Online games also began to grow in popularity, as modems allowed home computers to communicate with each other, leading to bulletin board systems (BBSs) and participation in multiuser domains (MUDs), which were previously only available on mainframes. Some early online games, such as *Sceptre of Goth* (1983), allowed as many as sixteen users to dial in at once and play. Home video game console systems first connected to the online world with the release of Mattel's PlayCable service in 1981. Two years later, the CVC Gameline Master Module, a device that plugged into the cartridge bay on the Atari VCS 2600 and into a phone jack, allowing games to be downloaded and played, required a subscription to the service.

In the mid-1980s, CD-ROM technology greatly enhanced the storage capacity of home computers with optical discs that could store 650 megabytes of data. Cyan's *The Manhole* (1987) is generally considered to be the first game released on CD-ROM, leading the way for CD-ROM-based games that could contain much larger game worlds because of the greater memory capacity, such as Cyan's *Myst* (1993), a best-selling game that encouraged the sales of computers with CD-ROM drives. More memory also allowed room for full-motion video (FMV) to be incorporated into games, essentially picking up where laserdisc games had left off. Soon home console systems began the changeover to CD-ROM technology; a CD-ROM add-on was released as a peripheral for the NEC PC-Engine/Turbografx-16 in 1989 and for the SEGA Mega Drive/SEGA Genesis in 1992. And in 1991, the FM Towns Marty, the first 32-bit system, became the first console system with a built-in CD-ROM drive. Released only three years later, the Nintendo 64 would be the last major system *not* to use CD-ROMs.

By the late 1980s, computing power was becoming fast enough for three-dimensional computation using filled-polygon graphics. Computationally true three-dimensional graphics had appeared in vector games such as *Speed Freak* (1978), *Battlezone* (1980), and *Star Wars* (1983) and in one raster game, *I, Robot* (1983), in which filled-polygon graphics were used, but the demands of such graphics resulted in a simpler game world than what two-dimensional graphics could offer using hundreds of sprites. As computing power and speed improved, three-dimensional filled-polygon graphics returned to the arcade in such games as *Hard Drivin'* (1989) and *S.T.U.N. Runner* (1989), but it was not until the 1990s that three-dimensional graphics became the dominant form of graphics. Home consoles and home computers were not far behind arcade games, and they also began to feature three-dimensional graphics as well, both as prerendered graphics (like those of *Myst* and *Riven* [1997]) and those rendered in real time (like those of *Tomb Raider* [1996]). By the mid to late 1990s, home games had advanced to the point where they could compete with arcade games and draw their audiences away from them.

HOME GAMES DOMINATE

Home game consoles grew more powerful with each new generation of technology. After the Nintendo Entertainment System (NES) and other consoles of the third generation, such as the SEGA Master System and the Atari 7800 ProSystem, a new generation of 16-bit machines appeared, including the NEC PC-Engine/Turbografx-16 in 1987, the SEGA Mega Drive/SEGA Genesis in 1988, and the Neo•Geo produced by SNK (Shin Nihon Kikaku) Playmore and the Super Nintendo Entertainment System (SNES), both released in 1990. Arcade game technology and home game technology were converging to the point that some systems made the transition from one to the other. The Neo•Geo was SNK's home version of its arcade technology of the same name that allowed arcade operators to change games in a machine by simply changing a cartridge (an idea pioneered by Data East's DECO Cassette System in the early 1980s). In the other direction, the Nintendo Playchoice-10 system allowed Nintendo's arcade machines to play games that had previously only been available on the NES. Such interchangeability demonstrated just how far home consoles had come, as arcade games continued to lose their superiority.

The fifth generation of consoles were mainly 32-bit machines, including the FM Towns Marty released by Fujitsu in 1991, the 3DO Interactive Multiplayer and the Atari Jaguar in 1993, the SEGA Saturn and the Sony PlayStation in 1994, and the 64-bit Nintendo 64 in 1996. Home computers became more powerful during this time as well, and emulators for earlier game consoles began to appear on them. The mid-1990s were also long enough after the early days of video gaming so that nostalgia for early games began to appear as well as retrogaming, which also encouraged an interest in emulators. With more computing power and larger storage capacities, thanks to CD-ROMs, which became the standard medium for games released, replacing cartridges, home video games could now have three-dimensional graphics that were rendered in real time, allowing certain genres, such as first-person shooting games and first-person racing games, to become popular in the home and allowing many arcade games and franchises to be ported to home systems.

As arcades lost audiences to home games, the industry made attempts to win audiences back. More unusual interfaces and controllers that were not available in the home appeared and helped to redefine the arcade experience throughout the decade, such as cabinets with sit-on or ride-in capabilities, dance mats (like that for *Dance Dance Revolution* [1998]), drum kits, guitars, and other interfaces for rhythm and dance games. Two virtual reality (VR) games, *Dactyl Nightmare* (1992) and *Virtual Combat* (1993), even appeared. But along with technological innovations came a cautious retreat to more tried-and-true genres, including vertically oriented shooting games, fighting games, and driving games. The number of games produced in these genres expanded while other genres shrank, and fewer innovative game designs were produced. More sequels and series games were made, relying on their predecessors' successes for instant recognition and acceptance. Few, if any, arcade games from the mid-1990s became household names among nonplayers. Perhaps only *Mortal Kombat* (1992) was widely known among the general public, and infamously at that, because of the controversy surrounding the game's extreme violence. Eventually, even the arcade itself would be redefined as a game center or cybercafé, as operators tried to lure players back. In Japan, the 1990s also saw arcades being transformed into *amyuuzumento sentaa* (amusement centers) that were more family oriented and untainted by the seedy image that arcades sometimes had.

Another way that home gaming became dominant was through the growth of online games during the 1990s. Online gaming gave home gamers the social element and the opportunity to play with strangers that only the arcades could provide before. Multiplayer online games grew and were able to accommodate a larger and larger number of players, eventually becoming known as massively multiplayer online role-playing games (MMORPGs), with hundreds of thousands of players around the world. The first game to be considered an MMORPG was 3DO's *Meridian 59* (1996), but by the end of the 1990s, the three main MMORPGs with the most players were *Ultima Online* (1997), *EverQuest* (1999), and *Asheron's Call* (1999).

Handheld games and portable gaming systems also grew in popularity during the 1990s. Handheld electronic games had been around since the mid-1970s, and the first handheld game console system was Milton Bradley's Microvision system of 1979; however, it was not until a decade later that handheld consoles found success. In 1989, the Nintendo Game Boy, designed by Gunpei Yokoi, was released as well as the Atari Lynx, and in 1990, they were joined by SEGA Game

Gear. Of the three, the Game Boy was the most popular and, with its line of other Game Boy systems, went on to become the best-selling line of game console systems, selling more than two hundred million units combined as of 2011. Handheld game systems, with their tiny screens and limited graphics capabilities, proved that simpler games with low-resolution graphics could still attract an audience.

Handheld systems, portable gaming devices, and online gaming helped video games to spread around the world, where console gaming had begun to establish a foothold since the days of *PONG* clones in the 1970s. During the 1980s and 1990s, video games grew into a global industry as imports from North America and Japan found success and encouraged indigenous game production. Although some countries produced their own game systems or computers, such as the Italian Zanussi Ping-o-Tronic of 1974, New Zealand's Sportronic system in the late 1970s, and Al-Alamyeeh's Sakhr home computer system in Kuwait in 1981, indigenous game production flourished on home computer systems because companies only needed to produce software that could run on other established systems, which also provided a much larger potential audience than would the sales of a new hardware system. (It is perhaps for this reason that the term *computer games*, as opposed to *video games*, is found so often in European game scholarship.) By the end of the 1990s, the global reach of video games provided a worldwide audience that made the industry even more competitive as technology advanced and more venues for video games appeared.

THE INDUSTRY EXPANDS

The sixth generation of home video game consoles began with the SEGA Dreamcast in 1998, which would be the company's last console system and was discontinued in 2002. Other systems of the generation included the Sony PlayStation 2, released in 2000 (and still selling as of 2011); the Nintendo GameCube released in 2001 and discontinued 2007; and the Microsoft Xbox released in 2001 and discontinued in 2006. Part of the reason for the shorter life spans of these systems was the relatively quick advance to what is considered the seventh generation of consoles, which includes the Microsoft Xbox 360, released in 2005, and the Sony PlayStation 3 and Nintendo Wii, both released in 2006. These systems all had online capabilities and services; could play other media, such as CDs and DVDs; made gestural interfaces available; and in the case of the PS3, also introduced high-definition gaming on Blu-ray Discs.

Other game markets grew as well. During the 2000s, the number of players of MMORPGs rose into the millions, with the largest one, *World of Warcraft* (WoW [2004]), reaching fourteen million subscribers by the end of 2010. As the World Wide Web continued expanding, web-based games became a new type of online game, one often associated with casual games, and were played on personal computers as well as cell phones and eventually iPods, iPads, and other devices used for mobile gaming, which is a dominant form of gaming in areas of the world with limited infrastructure, such as Africa.

The ability to play games online also led to the production of advergames, used to advertise products in a way that engages the user, and games designed for social media, such as *FarmVille* (2009) and *Mafia Wars* (2009). With the growth of cloud computing, an increasing number of games can be leased online instead of purchased. As digital distribution and downloadable content (DLC) and the bandwidth of home internet connections continue to expand, online games may one day begin to supplant home consoles and home computer gaming, becoming the dominant form of gaming.

In addition to advergames, the 2000s also saw a variety of other new uses of video games in business, art, and education in such areas as job training, gym class, and simulations demonstrating or exploring ideas interactively. Video game studies also arose, and scholarly investigation of video games began in the form of books, journals (both print and online), conferences, museum exhibits (e.g., *Videotopia*), and university classes and programs, not only in North America and Europe but also in many countries around the world. The study of older games occurred in academia as well as in many online communities of gaming hobbyists and people collecting video games, who together have built extensive online archives of games and game-related materials—for example, the Killer List of Videogames, the Arcade Flyer Archive, and the International Arcade Museum. The retrogaming movement also has increased interest in early games, and a growing number of archives and organizations, such as the Video Arcade Preservation Society, are attempting to document and preserve as much early video game history as possible.

The eighth generation of home consoles includes the Nintendo Wii U (released November 18, 2012 and discontinued January 31, 2017), the Sony PlayStation 4 (released November 15, 2013), and the Microsoft Xbox One (released November 22, 2013). Since then, Nintendo has also released the Nintendo Switch in 2017, and that same year also saw the releases of console variations such as the PlayStation 4 Slim, PlayStation 4 Pro, Xbox One S, and Xbox One X. Due to the complexity of the technology involved, generation groupings now mainly indicate simultaneous release times, as the technology of the console systems varies so much. Also, other platforms, such as tablets, phones, augmented reality, and virtual systems such as the Oculus Rift and HTC Vive, are drawing audiences away from traditional consoles and redefining gaming technology. Further competition comes from online gaming, where games can be purchased directly through portals such as Steam and Google Play, allowing them to be made and marketed more cheaply, which in turn has allowed game companies to be started with very little overhead or even by single individuals. This has also helped abstract and experimental games find their audience, resulting in a much wider variety of games available, and has greatly promoted the growth of games as an art form.

Video games are as established as a medium as film and television, and they represent a good part of the way many people spend their free time. As games become even more embedded in daily life, through their use in forms of interactive media, they will remain both a part of popular culture and an intriguing object of study.

Mark J. P. Wolf

See also: Generations of Technology

Further Reading

Baer, Ralph H. *Videogames: The Beginning*. Springfield, NJ: Rolenta Press, 2005.

Burnham, Van. *Supercade: A Visual History of the Videogame Age 1971–1984*. Cambridge, MA: MIT Press, 2003.

Demaria, Rusel, and Johnny Wilson. *High Score!: The Illustrated History of Electronic Games*. Berkeley, CA: McGraw-Hill/Osborne, 2002.

Herman, Leonard. *Phoenix: The Fall and Rise of Videogames*. Springfield, NJ: Rolenta Press, 1994.

Kent, Steven. *The Ultimate History of Video Games: From Pong to Pokémon and Beyond*. New York: Three Rivers Press, 2001.

Wolf, Mark J. P., ed. *Before the Crash: Early Video Game History*. Detroit, MI: Wayne State University Press, 2012.

Wolf, Mark J. P., ed. *The Video Game Explosion: A History from PONG to PlayStation and Beyond*. Westport, CT: Greenwood Press, 2007.

Hollywood Cinema. *See* Representations of Video Games in Hollywood Cinema

HoloLens

The HoloLens is an augmented reality (AR) head-mounted display developed and manufactured by Microsoft. It was first released as a development edition in 2016. Using Microsoft's existing Kinect technology, the device projects holographic objects and interfaces onto the environment in a stereoscopic manner. As the position of the device is defined by the spatial mapping of its environment, its holographic content can be positioned along with it, appearing to surround the HoloLens user. The field of view in front of the user is roughly said to be the size of a VHS tape. Three-dimensional audio speakers are integrated in the headset, as well as all the other processors, making it a cable-free stand-alone device with its own battery, which lasts for several hours. The operating system of the HoloLens is based on Windows 10. To control the device, there are several forms of input possibilities, the most prominent being the hand gestures Air Tap and Bloom. Other inputs are an accompanying clicker and speech recognition by Microsoft's virtual assistant Cortana.

Due to its high price of over $3,000, the target market for the HoloLens has mainly been industry, where it has been used as a tool for instructions on how to operate and maintain machines. An important feature for such a use has been Remote Assistance, which allows a person from far away to help the HoloLens user on-site via the device's shared camera. Other impressive uses are found in medicine and education due to the HoloLens' ability to overlay physical objects with their digital twins as well as additional information, thus augmenting the physical objects. For example, in surgery, a scanned organ can be overlaid onto the actual organ to help the surgeon in the operation. Another useful benefit of the overlay feature is being used in architecture and its related planning sectors;

the visualization of hidden infrastructures, such as electrical cables and water pipes, helps the user on-site to determine the situation more efficiently.

A man playing with Microsoft's HoloLens, a form of augmented reality technology. Virtual imagery can only be seen through the HoloLens viewer. (Khoamartin/Dreamstime.com)

One of the first games for the HoloLens developed by Microsoft to show the device's features in a playful way is *RoboRaid* (2016)—a first-person shooter in which one has to find and shoot robots coming out of the walls of the surrounding room. Another notable game presenting new ways of augmented storytelling is *Fragments* (2016), in which the player follows an audiovisual criminal story within the surrounding physical room. Following the game's holographic characters and cues, the player experiences a game that is unfolding in different parts of the room—a new form of immersive gaming.

Microsoft ceased production of the first HoloLens at the end of 2018 and presented the new HoloLens 2 in early 2019, with distribution starting later in the year. The second generation contains a larger field of view, new processors, ten-finger tracking, and more comfortable ergonomics. According to Alex Kipman, one of the main designers of the HoloLens, in this version, Microsoft again focuses on enterprise and industry, delaying its use for entertainment and gaming until the later iterations.

Philip Hausmeier

See also: Augmented Reality

Further Reading

Crecente, Brian. "HoloLens' Project X-Ray Delivers a First-Person Augmented

Reality Shooter." Polygon, June 16, 2015. Available at https://www.polygon.com/e3-2015/2015/6/16/8791473/hololens-project-x-ray-delivers-a-first-person-augmented-reality.

Stein, Scott, and Ian Sherr. "Why AR Is Going to Give You 'Superpowers' in the Future." CNET, February 28, 2019. Available at https://www.cnet.com/news/the-future-of-ar-according-to-microsoft/.

Home Computer Games. *See* Computer Games

Home Console Games. *See* Console-Based Games

Homebrew Games

Homebrew games are new titles created for classic game consoles such as the original Atari consoles, the ColecoVision, and other systems that traditional software publishers have abandoned. Homebrew games are often created by fans and video game hobbyists, and the quality of homebrew titles often matches or exceeds commercially released games. This is possible because the Information Age has made more knowledge and tools available to the modern retro-programmer than what was available to the original commercial developers.

When million-dollar room-sized mainframe computers left technology institutes and entered the home in the more practical form of home computers, manufacturers such as Tandy, Apple, Commodore, and Atari brought computer programming, previously available only to a select few, to the masses. Kids and adults alike, wanting to make their own applications for business and play, began coding for their own needs and entertainment. Many computer magazines, such as *Electronic Fun* and *Compute!*, published homegrown code for others to type into their own computers. Shareware emerged on the computer scene, as programs could be easily copied and doled out on floppy diskettes and other forms of distributable media.

In time, console-based games began to emulate computers and offered cartridge programs, such as *Bally BASIC* (1978) for the Astrocade, *Computer Intro!* (1979) for the Odyssey^2, and *BASIC Programming* (1979) for the Atari VCS 2600. These were great learning tools and served to introduce home programming to the public. However, in the end, they were primitive and more of a novelty, not to be used for serious development. So when Atari released *KLAX* (1990) for the Atari 2600, the general consensus and expectation was that no further software would become available for the aging console. After all, games had been made for the system for thirteen years, and the system was originally meant to be marketed for only a few years.

However, the fan base and hobbyist scene continued, and as technology marched forward, private individuals learned how to resurrect the market from their basements and garages. Homebrew titles are mostly created in the programmer's spare time, as a labor of love, and with the most miniscule of budgets. Initially, programming for the 2600 was fairly complex. A programmer needed to learn how to write in computer code, including assembly language; how to deal with ROM and RAM (and do so in severe circumstances such as limited memory space); and how to compute with binary and hexadecimal number systems. Even understanding how a television set operates and how the screen refreshes was required to program the 2600. As if those obstacles were not enough, creating the physical cartridge hardware without a manufacturing plant was yet another massive hurdle to the homebrewer.

However, Harry Dodgson wanted to put his computer systems engineering degree to work by making new software for the Atari 7800. Dodgson did not have access to an Atari 7800 development kit, so he wrote one himself; the result was the *7800 Monitor Cartridge* (1993). Dodgson manufactured them himself, creating six copies before modifying them to also allow 2600 programming. At this point, the project was renamed the *7800/2600 Monitor Cartridge* (1993), and he created an additional nineteen cartridges before selling the rights to Atari retailer Video 61 and handing the task over to them.

A *Monitor Cartridge* user was able to program his or her own games by entering commands in 6502 assembly language using the Atari Keypad, Atari Kids' Controllers, and *Star Raiders* controllers. The actual programs had to be entered by converting the assembly language code to hexadecimal or by downloading the program via serial interface.

Ed Federmeyer, a software engineer, heard about Dodgson's work on Usenet and decided that he wanted to live his childhood dream and create software for the 2600. Before he could make his game, he needed a way to find out what sound the Atari 2600 would make when the sound register was changed. He did not want to have to assemble and burn an individual EPROM for each sound test, so he programmed *Sound X* (1994) to accomplish the task. When finished, he realized that other hobbyists might have use for the utility, so he polished it up and had Randy Crihfield, later known for Hozer Video Games, publish it in cartridge form.

With *Sound X* behind him, Federmeyer, seeing the demand for the utility, programmed and released the first console homebrew game on a cartridge for the 2600. The game was a *Tetris* (1985) clone titled *Edtris 2600* (1995). It sold for $16 and featured a continuous musical soundtrack, sound effects, an instruction manual, and a serial number programmed right into the game. It was Federmeyer himself who coined the term *homebrew* after reading about the Bay Area Amateur Computer Users Group in Steve Levy's book *Hackers*. Members that attended the club's monthly meetings included Eugene Jarvis, Steve Jobs, and Steve Wozniak.

To create these first pieces of new software for the 2600, Federmeyer did his programming on an IBM 486 clone using a 6502 cross assembler. He programmed with assembly language because the hardware had such limited memory. Programming on the 2600 is difficult, even for professional programmers. Procedures such as counting how long a task takes to execute are necessary when working with the 2600, a method usually not required with typical programming. On the 2600, depending on where the instruction is in memory, it may take longer to execute. So one instruction inserted into the wrong place will move any additional code up a byte in memory, and suddenly all the calculations will be incorrect. To actually manufacture the Atari 2600 cartridge, an EPROM burner was used to burn an EPROM and then the ROM chip was replaced with a socket and some additional wiring on an existing retail 2600 cartridge.

In January 1997, Bob Colbert's Retroware released *Okie Dokie* (1997), a puzzle/strategy game, also for the Atari 2600. When working on the title, Colbert limited himself to working with only 2K of memory. He purposely did this to see what it was like to program within the same standards and limitations of the original Atari employees. Colbert also holds the distinction of creating the third homebrew game, *Stell-a-Sketch* (1997), an Atari adaption of the popular Etch A Sketch children's toy by the Ohio Art Company. The title derived its name from "Stella," which was the codename for the Atari 2600 before it was released.

By late 1997, the 2600 homebrew scene had grown exponentially, with such releases as *The Dark Mage* (1997) and *Lunar Rescue* (1997; also known as *This Planet Sucks*) by Greg Troutman and *Oystron* (1997) by Piero Cavina. A website, referred to as the Atari 2600 Programming Page, organized by Nick Bensema, emerged that was dedicated to 2600 programming and hacking. The website promoted 2600 development and featured programming examples, learning exercises, programming tools, and other helpful documentation.

Currently, many years after the launch of the Atari 2600 in 1977, game development is still going strong on the platform. Dozens of homebrew games have been released, and most of the games are still being created in the traditional 6502 assembly language. In recent years, high-level compilers have become available for VCS development with the introduction of *Batari Basic* (2005) and *Visual Batari Basic* (2008) emerging as development tools.

While the Atari VCS currently has the largest homebrew community, it was not alone after Kevin Horton released *Kevtris* (1996) for the ColecoVision. Horton chose Coleco's platform because it was the only console ever released that used no proprietary parts. As a result, he was able to easily reverse engineer the system to learn how it worked. One programmer, Daniel Bienvenue, graciously shared years of research, documentation, and programming tool kits he created for the ColecoVision to the community. These proved invaluable to the emerging homebrew community, as they allowed other programmers to improve their skill set and even encouraged amateurs to give it a try.

Homebrew programmers usually focus on one platform. John Dondzila was the first to tackle multiple projects on numerous systems. Although Dondzila made games for the ColecoVision, he also released the first Odyssey^2 homebrew game, *AMOK!* (1998), based on Stern's popular arcade game *Berzerk* (1980). Dondzila also created the first Vectrex title, *Vector Vaders* (1996). The GCE/Milton Bradley Vectrex had a short life span on the market, selling for less than two full years, and had fewer than thirty commercially released titles during that time. The Vectrex is unique in the homebrew scene because more homebrew games have been produced for it than there were original commercially released titles.

No gaming hardware seems to be exempt, as homebrew games have been made available for most home consoles. Popular gaming platforms such as the Nintendo Entertainment System (NES) and the Game Boy Advance (GBA) easily attract development, but even more obscure systems, such as the 3DO Interactive Multiplayer, Philips CD-i, Fairchild/Zircon Channel F, VM Lab's Nuon, Atari Lynx, Atari Jaguar, and more, have all seen homebrew activity.

Even the first home video game console, the Magnavox Odyssey released in 1972, has received attention from the homebrew community. Retail titles were only published for the system in 1972 and 1973. In 2009, *Odball* was released as a homebrew title. This marked the longest period of time (thirty-six years) between an official release and a homebrew release for any console.

In 2004, Atari (owned by Infogrames) released a plug-and-play console resembling a miniature Atari 7800 called the Flashback. Although it did not have a cartridge port, it did have 15 2600 and 5 7800 games that were all stored internally. The following year saw the release of the Flashback 2, which resembled the original Atari VCS 2600 console and featured 40 Atari game titles. Surprisingly, it included several previously unreleased prototypes, game hacks, and homebrew games, including *Adventure II* (2005), *Combat II* (1983), *Wizard* (1980), and *Climber 5* (2004) (renamed *Atari Climber*). The Atari Flashback 9 was announced in late 2018 and will feature 110 games, with a "Gold" version featuring 120 games, including a few homebrew titles as well.

Although it does happen periodically, it is a rare occurrence for a homebrew game to be legitimately published. Because of the underground nature of homebrew gaming, it is unlikely that one would find them advertised in magazines or on television or on store shelves. Many homebrew game releases are the highlights of small retrogaming get-togethers and conventions, such as the recurring Portland Retro Gaming Expo, or sold online by the programmers themselves and a few small companies.

Modern-day distributors and publishers include Atari Age (AtariAge.com) and Good Deal Games' Homebrew Heaven (GoodDealGames.com). The original homebrew manufacturer, Randy Crihfield, also still builds games for the 2600 and, as of 2019, proudly stated that he had personally manufactured almost thirty thousand individual Atari 2600 cartridges.

Michael Thomasson

See also: Atari; ColecoVision

Further Reading

Matherne, Brian. *The Atari 2600 Homebrew Companion*. Vol. 1, *34 Atari 2600 Homebrew Video Games*. Self-published, Amazon.com, May 9, 2018.

Rojas, Fred. "Homebrew." *Gaming History 101*, January 17, 2012. Available at https://gaminghistory101.com/2012/01/17/homebrew/.

Hong Kong

Hong Kong is one of the game consumption centers in Asia. Gaming is more than a mainstream youth culture, it is also well received among children and adults. It is no exaggeration to say that gaming has become a part of daily-life entertainment; on a train or bus, you will always find someone playing games. An interesting episode occurred in 2018 when legislator Tommy Cheung Yu-yan was criticized by the media for playing his mobile game in the Legislative Council. Gaming has had a strong impact in Hong Kong, and game jargon has been picked up by young people and the media. Game consoles, software, magazines, and other forms of merchandising sell well in the market. Almost all families have at least one home game console, and most young people have their own handheld game console. Playing mobile games on the train or bus is a daily scene. Game shows such as Asia Game Show (since 2002) and Animation-Comic-Game Hong Kong (since 2004) attract large audiences and media coverage.

Gaming in Hong Kong has five major characteristics. First, it follows the latest developments closely. For geographic, economic, and legal reasons, foreign game consoles and software are usually introduced into Hong Kong soon after their global launch. Hence, the craze for new consoles or software occurs almost simultaneously in Hong Kong as in Tokyo and New York. Many foreign game manufacturers have branches or agencies in Hong Kong to launch their latest products. Through the parallel importation of both licensed and pirated items, local electrical appliance shops and game shops sometimes introduce new game products even faster than authorized agencies.

Second, game consumption is comprehensive. Whereas China and South Korea focus on online games, Hong Kong is more balanced in gaming and different types of games, such as home console games, handheld games, arcade games, home computer games, online games, and mobile games share the market. Home console games and handheld games remain popular. In the public space, game arcades and online game centers are everywhere in Hong Kong, patronized by adults as well as youngsters. Mobile gaming is the fastest-growing sector in gaming consumption and has attracted many players from all ages.

Third, Japanese games have been leading the market. Since the rise of the game culture in Hong Kong in the 1980s, Japan has been the name of the game. From the arcade games and Nintendo Entertainment System (NES) games in the 1980s to the Nintendo Game Boy and Sony PlayStation craze in the 1990s, Japanese games had dominated the Hong Kong market for more than two decades until the debut of Microsoft Xbox and the rise of Korean online games in 2002. In recent years, both PS4, Xbox One, and Nintendo Switch have their own supporters. The Japanese games face a stronger competition in online and mobile games.

Fourth, game piracy is prevalent. The Hong Kong government has been more successful in cracking down on audiovisual piracy and computer software piracy than on game piracy. From the 1980s to the present, Hong Kong has been a consumption and distribution center of game piracy, and pirated game CD-ROMs made in China, Taiwan, and Hong Kong have had a wide circulation. Recently, digital piracy has become the major form of game piracy, as Hong Kong players download games for free from websites in China. Piracy is the main reason for the popularity of home console games and handheld games. Some Hong Kong players have never purchased any licensed game software. The popularity of online games and mobile games as well as the difficulty of playing pirated games on new generation game consoles such as the PS4 have caused the gradual decline of game piracy.

Fifth, and finally, the development of Hong Kong games is slow. Hong Kong is a consumption base for Japanese and foreign games. Because of problems in capital, talent, and technology, Hong Kong games are few in number, and most are not very popular. Hong Kong game companies are more willing to serve as the agencies for foreign games rather than to develop their own games. Hong Kong games are usually computer games, online games, and mobile games, but only a few (such as *Tower of Saviors* [2013]) do well in the local market. The Hong Kong government has been discussing developing a creative industry for years, but neither long-term development plans nor logistics support have been made to help the Hong Kong game industry. In 2018, the government declared that it will allocate HKD 100 million to promote esports. The future of video game industry in Hong Kong remains uncertain.

Benjamin Wai-ming Ng

See also: China

Further Reading

Ng, Benjamin Wai-ming. "Hong Kong." In *Video Games around the World*, edited by Mark J. P. Wolf, 207–218. Cambridge, MA: MIT Press, 2015.

Ng, Benjamin Wai-ming. "Video Games in Asia." In *The Video Game Explosion: A History from PONG to PlayStation and Beyond*, edited by Mark J. P. Wolf, 211–222. Westport, CT: Greenwood Press, 2007.

Horror Games. *See* Survival Horror Games

Houser, Sam (1971–) and Dan (1973–)

Brothers Sam and Dan Houser are cofounders of video game publisher and developer Rockstar Games. Sam was born in London in 1971, the first son of *Get Carter* (1971) actress Geraldine Moffat and Walter Houser, the manager of the London jazz club Ronnie Scott's. Dan was born in 1973.

While studying at the University of London, Sam worked as a part-time video director at the London offices of music label BMG, where his work included a video for UK boy band Take That. After graduating in 1994, Sam asked to be transferred to the company's new interactive division, BMG Interactive. By 1996, Sam had become BMG Interactive Europe's head of development, a job that also involved helping to oversee the publishing of the first *Grand Theft Auto* game (1997). After studying literature at Oxford University, Dan also joined BMG Interactive as a writer and producer, working on titles such as *You Don't Know Jack: Volume 2* (1996).

In early 1998, BMG decided to exit the video game market, and Sam began looking to find other publishers who would pick up the games BMG already had in development. This led to Take-Two Interactive Software buying BMG Interactive in a stock swap deal. As part of the acquisition, Take-Two brought Sam to its New York City base to become the company's head of development. While Sam moved to New York, Dan remained in London. During the rest of 1998, Sam worked on games published by Take-Two, such as the soccer game *Three Lions* (1998) and *Space Station Silicon Valley* (1998).

Toward the end of 1998 Sam won approval from Take-Two to open a new publishing label called Rockstar Games. Sam envisaged Rockstar Games as a publisher of big-budget games that have a popular culture resonance and break away from the fantasy, science fiction, and cartoon themes that dominated the video games being released at the time. The idea was also to establish Rockstar Games as a brand that inspired enough consumer loyalty to get people to buy its games just because they carried the Rockstar label.

To help form Rockstar Games, Sam brought his brother Dan, school friend Terry Donovan, and former BMG Interactive employee Jamie King to New York City. In December 1998, Rockstar Games was officially founded. Today, Sam is Rockstar's president and executive producer, and Dan is the company's vice president of creative. Since forming Rockstar Games, the pair's credits include *Thrasher Presents Skate and Destroy* (1999), *Midnight Club: Street Racing* (2000), *Smuggler's Run* (2000), *Max Payne* (2001), *State of Emergency* (2002), *Manhunt* (2003), *Red Dead Revolver* (2004), *The Warriors* (2005), *Rockstar Presents Table Tennis* (2006), *Bully* (2006), *Red Dead Redemption* (2010), *L.A. Noire* (2011), *Max Payne 3* (2012), and *Red Dead Redemption 2* (2018).

Tristan Donovan

See also: Rockstar Games

Further Reading

"The Fall of BMG Interactive" *Next Generation* 4, no. 41 (May 1998).

Kushner, David. *Jacked: The Unauthorized Behind-the-Scenes Story of Grand Theft Auto*. Hoboken, NJ: John Wiley & Sons, 2012.

HTC Vive

The HTC Vive is a head-mounted virtual reality (VR) system originally released in April 2016. It works on a PC, and at the time of its release, it was the only head-mounted (VR) system that allowed for room-scale movement: that is, the system tracks movement across the space of a small room.

The Vive was the result of a partnership between Valve, the company that created *Half-Life* (1998) and the Steam online PC game store, and HTC, a Taiwanese cell phone manufacturer. Valve had begun to experiment with VR in 2012, and HTC also started working on the technology separately in 2013. Valve was not looking to manufacture its own product, and in January 2014, it announced a partnership with Oculus. Shortly thereafter, however, Facebook purchased Oculus, and Valve agreed to cooperate with HTC instead in the spring of 2014. The Vive was officially announced in March 2015, and the product launched on April 5, 2016, about a week after its competitor system, the Oculus Rift, was released, and several months before the PlayStation VR (PSVR) system.

The Vive system consists of a head-mounted visual unit that is common to all VR systems as well as two handheld controllers. The system also has two base stations, running on Valve's SteamVR software, that need to be mounted at opposite corners of a play space with a maximum recommended size of about eleven feet by eleven feet. The stations use laser tracking technology to monitor the positions and movements of the head-mounted unit and controllers. This allows the Vive user to move around the room, which, when the system was first released, was unique; all other VR systems at the time only allowed the tracking of head movement. The base station–tracked controllers were also unique to the Vive when it first launched.

A girl playing a video game in the HTC Vive virtual reality headset and handheld controllers on exhibition at Cebit 2017, in Hannover, Germany. (Alexander Tolstykh/ Dreamstime.com)

Despite its technological advantages, however, the Vive consistently trailed the Oculus Rift and the PSVR in sales during its first few years on the market. The Vive was the most expensive of the three, with a launch price of $800 (versus $600 for the Oculus Rift) and, like the Rift, required a fairly powerful PC to successfully run it. In the years following the initial release, Oculus added motion-tracked controllers and room-scale movement and dropped its price. The PSVR quickly became the best-selling unit, likely due to its low price and the large customer base with PS4s ready to use the system. Despite the hype surrounding VR in the years prior to 2016, sales of all three systems disappointed many people in the industry, suggesting that it may be some time before VR becomes a major gaming platform.

Because of the relatively low sales, no Vive game rose to anything like the sales levels of established game systems. However, there were a number of games that had a kind of hit status within this smaller gaming ecosystem. Early titles were typically more limited games that tended to act as proof-of-concept pieces.

All Vives, for instance, shipped with a collection of minigames called *The Lab* (2016), set in a comical version of Aperture Laboratories (from the world of *Portal*). *Job Simulator* (2016) is a humorous set of tasks set in a future where robots have replaced humans. Several early games had kind of genre-defining roles, such as the zombie shooter *Arizona Sunshine* (2016) and the archery game *Holopoint* (2016). Many of these early games were essentially point-and-click/shoot or environmental exploration games.

However, the Vive did see some different styles of game succeed. *Superhot* (2016), the popular indie title that creatively plays with typical shooter mechanics, jumped to VR (although it was not initially officially available for the Vive). *Star Trek: Bridge Crew* (2017) is a multiplayer title that allows internet-connected VR players to collectively pilot the USS *Enterprise*. *I Expect You to Die* (2017) is a James Bond–style escape room puzzler. *Beat Saber* (2018) is a VR rhythm game that was hugely popular. And a number of big-budget game titles made the jump to the Vive and other VR systems, perhaps the most notable being Bethesda's *Fallout 4 VR* (2017) and *The Elder Scrolls V: Skyrim VR* (2018).

On April 5, 2018, HTC released the Vive Pro, which incorporated a higher resolution headset, the capacity for a much larger play space with two extra base stations, and a number of other small adjustments. By the end of 2018, it appeared the partnership between HTC and Valve was ending, as HTC planned to release products that did not use SteamVR and Valve was developing its own VR hardware, the Valve Index. Nevertheless, the HTC Vive was a key technology for demonstrating the technological (and to some extent, commercial) viability of room-scale VR.

Kevin Schut

See also: Virtual Reality

Further Reading

Robertson, Adi. "HTC Vive Review." The Verge, April 5, 2016. Available at https://www.theverge.com/2016/4/5/11358618/htc-vive-vr-review.

Souppouris, Aaron. "How HTC and Valve Built the Vive." Engadget, March 18, 2016. Available at https://www.engadget.com/2016/03/18/htc-vive-an-oral-history/.

Huizinga, Johan (1872–1945)

A Dutch cultural historian known for his interest in the Middle Ages (famous for *The Waning/Autumn of the Middle Ages* [1919]), Johan Huizinga is unquestionably the author of the most influential twentieth-century examination of play. Followed as much as criticized (as with many groundbreaking works, it is not free of contradictions), his *Homo Ludens: A Study of the Play-Element in Culture* (1938) remains the founding work of game studies.

As opposed to the German psychologist Karl Groos, who explained play from a biological perspective (in *The Play of Animals* [1896] and *The Play of Man* [1899]), Huizinga considers play as a cultural phenomenon. For him, play is not a part of culture insofar as culture already had a play-like character in its earliest phases. Because "play is older than culture," he argues, "civilization arises and unfolds in and as play" ([1938], 1955, ix). The Roman Empire, the Middle Ages, the Renaissance, the age of humanism, the seventeenth century with its Baroque forms, the eighteenth century with its rococo ones, and contemporary civilization can therefore be seen from the perspective of play. For Huizinga, "real civilization cannot exist in the absence of a certain play-element" ([1938], 1955, 2011). It will always be played according to certain rules and will always demand fair play.

Because Huizinga sees play as a special and significant form of activity with a social function, he wishes "to take it as the player himself takes it" ([1938], 1955, 4). Showing that the play concept as expressed in language does not have a clear definiteness, one of his first tasks in *Homo Ludens*, and certainly the most important one, is to give a definition of *play*:

> Summing up the formal characteristics of play, we might call it a free activity standing quite consciously outside "ordinary" life as being "not serious" but at the same time absorbing the player intensely and utterly. It is an activity connected with no material interest, and no profit can be gained by it. It proceeds within its own proper boundaries of time and space according to fixed rules and in an orderly manner. It promotes the formation of social groupings which tend to surround themselves with secrecy and to stress the difference from the common world by disguise or other means. (Huizinga [1938] 1955, 13)

Coupled with its historical-cultural approach, the identified criteria enable Huizinga to show and to analyze the presence of play in the advent and the state of various forms of social activities. For instance, as a play category, competition can be seen in "an oracle, a wager, a lawsuit, a vow or a riddle" ([1938], 1955, 105). War and all fighting bounded by rules limiting actions are to be associated with play. By their polemical and agonistic nature, science and philosophy fall within the realm of play. Because poetry and art lie beyond seriousness, creating things that are not bounded to the physicality, logic, and causality of "ordinary life" but lying outside the reasonableness of the practical, they have a ludic function.

Although "in acknowledging play you acknowledge mind, for whatever else play is, it is not matter" ([1938], 1955, 3), our species should not only be called for Huizinga by the name of *Homo sapiens* (Man the Thinker) or *Homo faber* (Man the Maker) but also by the nomenclature of *Homo ludens* (Man the Player).

Bernard Perron

See also: Caillois, Roger; Magic Circle

Further Reading

Huizinga, Johan. *Homo Ludens: A Study of the Play-Element in Culture*. Boston: Beacon Press, [1938] 1955.

Hungary

In the 1940s and 1950s, Hungarians were among the pioneers of computer science: John von Neumann is regarded as one of the fathers of the digital computer, and John G. Kemeny is the codeveloper of the BASIC computer language. The well-known Hungarian creativity and affection involved in gaming can be found both in von Neumann's game theory and in inventions such as the Rubik's Cube, which became a world phenomenon in the 1980s. This creative energy, coupled with Hungary's relatively liberal political and economic status among the countries behind the Iron Curtain, led to the development of a gaming industry and gaming culture that was unique in the socialist bloc.

The roots of Hungarian video game history can be traced back to the first cybernetic games, the "thinking machines" of Mihály Kovács, the Piarist priest and first teacher of computing in high schools. His "agrarian-simulation" game *The Farmer, the Wolf, the Goat, the Cabbage* (1967) could be played on the cybernetic building kit called the Mikromat. Charles Simonyi, who later became one of the leading software architects at Microsoft and also the fifth space tourist, developed various tic-tac-toe games on the Ural II mainframe computer that was built in the former Soviet Union. A similar program, called *Taktik* (1960–69), was developed for the Hungarian M-3 computer by the computer engineer József Drasni in the Cybernetic Research Group of the Hungarian Academy of Science in the 1960s. These early games were followed by several early *PONG* console clones, for example, the *Sportron* in the 1970s by the TV-manufacturing company Videoton.

The computer game industry started to flourish in Hungary during the early 1980s, when Gabor Rényi, the founder and the director of the company Novotrade, and Robert Stein, a Hungarian Jewish emigre living in the United Kingdom and the president of the company Andromeda Software, made an agreement: Hungarian freelance programmers will develop games for Andromeda, which will distribute those games in the West. (Gábor Rényi already had a previous experience in trading with electronic games. For example, before the foundation of Novotrade, he helped to put on the market the electronic handheld puzzle LED game called XL25 that was developed in 1982 by three Hungarian mathematicians: Gábor Dávid, Ferenc Szathmáry, and László Mérő.) Novotrade was a joint-stock company that was backed by Hungarian banks and could carry on intensive exportation-importation activity (including computers, software products, and medical instruments), which was completely unusual in the Communist economy (or "Comecon") countries. In 1983, on the TV program *I Present for National Economical Development*, Novotrade announced a competition that anyone could enter by submitting a synopsis or a concept for a computer game. The best ideas were programmed by (the then virtually nonexistent) Novotrade programmer team or by the applicant, who would be loaned a computer for the period of work. The competition was a good opportunity for Novotrade, not only for collecting game ideas but also for recruiting programmers for future projects. In the following months, the company received hundreds of synopses that were carefully selected by Rényi, Stein, and, finally, by David Bishop, who was a producer at the Andromeda and had a more accurate knowledge about computer games.

During November 16–18, 1983, the Hungarian Trade Commission held a show in London, where they presented some of the new branches of the Hungarian economy and industry, including computer games. The four games introduced to the British press were *Caesar the Cat* (1983), *Dancing Monster* (1983), *Chinese Juggler* (1983), and *Buffalo Roundup* (1983). The magazine *Popular Computer Weekly* featured two of these games, *Caesar the Cat* and *Dancing Monster*, on its cover and praised the originality and freshness of Hungarian games.

In the following year, rapid development started, and this period can be characterized as the golden age of video game history in Hungary. The success of Hungarian games in this period can definitely be connected to their freshness (which partly originates from the fact that programmers were not familiar with Western games) but also to their high-quality animation, which was, on the other hand, linked to the tradition of Hungarian hand-drawn animation. (Several animators of the Pannonia film studio, including Tamás Waliczky, who later became one of the best-known computer artists in the world, worked for Novotrade in their spare time.) During this period, Novotrade still consisted of a relatively small staff, and most of its projects were developed by various external studios whose developers received their salaries in royalties.

One of the most prolific studios was the Caesar studio, led by Donát Kiss and András Császár. They developed Domark's *Eureka!* (1984), a time-traveling text adventure game based on Ian Livingstone's design ideas and the company's aggressive marketing strategy. The first person who finished the game and called Domark with a secret code earned £25,000. Another huge success for Andromeda was *Scarabaeus* (1985), a pseudo-3-D action-adventure game, and *Traffic* (1984), which was marketed not only in the United Kingdom but in Japan as well. *Last Ninja* (1987), one of the most successful Commodore 64 games of all time, was also partly developed in Hungary by the programmers of SoftView studio; however, it was later reprogrammed and finished in the United Kingdom. Tamas Révbíró, Novotrade's art director, was responsible for the concepts of several games, such as Gremlin's *Alternative Word Games* (1987). Novotrade even developed games for U.S. distributors, including the highly successful *Impossible Mission II* (1989) for Epyx and the Atari ST version of *Karateka* (1988) for Brøderbund.

Besides these international successes, the company developed games for the local market as well. Studio A, led by Vilmos Kopácsy, was responsible for rewriting various successful 8-bit games and also for developing original games for the Enterprise computer, which was a commercial flop in the United Kingdom and in Germany but appeared on the shelves of the Hungarian store Centrum in 1990. Two other computers that were not a big success in the West, but were distributed in Hungary as a part of the school computer project, were the Commodore Plus/4 and Commodore 16. Octasoft, a branch studio of Novotrade, mainly developed educational programs for these computers. However, there were also some indie companies and programmers developing games for these computers, just like for another machine, the Videoton TVC, that was based on the Enterprise's architecture. These games were usually clones of various Commodore 64 or ZX Spectrum blockbuster games.

The old business model of the 1980s, and the "charming" attitude of Hungarian games, was no longer enough for the survival of Novotrade, and in

1989, the company went through a reorganization. The management of the company went to András Császár, and a new office of Novotrade International was opened in Palo Alto, California, where Stephen J. Friedman became the CEO. Later, in 1996, the company was rebranded and renamed Appaloosa Interactive. The biggest success of the new company was *Ecco the Dolphin* (1992) for the SEGA Genesis, with project manager László Szenttornyai and graphic artist Zsolt Balog. Besides various sequels (*Ecco: The Tides of Time* [1994] and *Ecco Jr.* [1995]), the company developed other successful and cartoonlike games for SEGA, including *Three Dirty Dwarves* (1996), and also kids' games for Electronic Arts (EA), including *Peter Pan: A Story Painting Adventure* (1993) and Rudyard Kipling's *The Jungle Book* (1995).

In the shadow of Novotrade, new freelancer programmers and companies emerged from the late 1980s. One of the pioneers was István Rátkai, who developed Commodore 64 text adventure games, such as *Time Archeologist* (1987) and *The Revenge* (1988). These acquired cult status, being the first professional adventures in Hungarian language. The company Art Games developed a successful RPG, *Abandoned Places* (1992). Another RPG called *Perihelion: The Prophecy*, which was developed by Edvard Toth, Gyula Szentirmay, and Zoltán Végh, was published by Psygnosis in 1993 for Amiga computer. Robert Olessák wrote an extremely complex text adventure game for the Commodore 64, called *The Galleon* (1993), which, unlike any other previous Hungarian adventure games, understood complex sentences and even conjugations. The RPG–text adventure game hybrid *Newcomer* (Cinematic Intuitive Dynamix, 2001) was developed for almost ten years and is regarded as one of the most complex games ever written for Commodore 64.

In the late 1990s, a new company called Digital Reality Software emerged, whose *Imperium Galactica* (1997) and *Imperium Galactica II: Alliances* (1999) are good examples of 4X real-time space strategy games, both of which became international successes. This success likely inspired other real-time strategy games from the early 2000s, such as Philos Laboratories' Aztec-themed *Theocracy* (2000) and StormRegion's *S.W.I.N.E.* (2001). Invictus Games' *1NSANE* (2001) was an off-road, multiplayer car racing game that became an international hit. Philos Labs worked for years on a very ambitious steampunk tactical-adventure game, called *Escape from Alcatraz,* but went bankrupt during the development process; only a rip-off of the game was published, called *Rebels Prison Escape* (Hip Interactive Corp, 2003).

During the 2000s, other smaller companies released games, including Human Soft's *The Wild Thornberrys Movie* (2002), Clever Games' *Terminator 3: War of the Machines* (2003), Black Hole Entertainment's *Warhammer: Mark of Chaos* (2006) and *Might M Magic: Heroes VI* (2011), and Mithis Games' *Nexus: The Jupiter Incident* (2005). However, none of these companies could repeat Novotrade's success, and after a few years of existence, most of them went bankrupt. More recently, NeocoreGames' *King Arthur: The Role-Playing Wargame* (2009) and *The Incredible Adventures of Van Helsing* series gained international reputation. As of 2019, the Hungarian game industry is characterized by smaller companies, working for niche markets, such as Zen Studio's pinball video games or Invictus Games' racing games. The most famous animation company is Digic Pictures 3D, which has worked on extremely successful international trailers and cinematics for the *Assassin's Creed* franchise and for games such as *Civilization V* (2010), *Halo 4: Infinity* (2012), *The Witcher 3*: *Wild Hunt* (2015), *Destiny 2* (2017), *The Last Guardian* (2017), *Lost Ark* (2018), and the *Awaken* (2019), a *League of Legends* cinematic.

One of the most interesting chapters of Hungarian and also of Eastern European game history is the existence of gaming clubs in the 1980s and early 1990s and the special subculture of those clubs. Unlike in Western Europe, in ex-Communist counties, home computers were extremely expensive for the public, so they were usually bought in the West and smuggled through the Austro-Hungarian border. The newest games were also impossible to obtain legally, which gave birth to famous copy-parties and to various importer and swapper groups. Computer clubs, based in community houses, were important meeting points for people who could not otherwise change software, gather information about the latest games, and discuss various subjects of computing. As there was no software copyright law or software police in Hungary around that period, clubs flourished, and pirated copies quickly spread within the country.

The most famous of these clubs was in the legendary community house called Csokonai. Csokonai, or as it was called, "Csoki" (meaning "chocolate"), was in a poor outskirt of Budapest: this relative isolation provided freedom in activity while the extreme agility of the director, Lajos Toth, quickly forged a huge community around the ZX Spectrum, Commodore, and Amiga computers. (Console culture was almost nonexistent in Hungary that time.) On Saturdays, the club was opened to the general public, but the "closed" club operated on Friday afternoons. For the privilege of becoming a member, you had to have the recommendation of two club members. The Microclub of Csokonai, as it was often called, later started to organize annual computer shows called Computer Christmas. The first one was held in the community house, but in 1986, it moved to the great hall of the Hungarian Technological University. In 1987, after the Budapest International Fair, it was already the biggest computer show in Hungary, with hundreds of exhibitors and thousands of people from all around Hungary swarming around computers and exchanging programs.

Lajos Tóth, the organizer of the Computer Christmas, recalls that a man was once sent from a cultural institute in Moscow to see what was going on there. During 1990–92, people from the countryside were already coming in buses. For many people from the countryside, these parties were the main opportunities to meet other people with the same interests and to obtain the newest games. A unique event of these Christmas Shows occurred in 1986 when the technicians of the Magyar Posta (Hungarian Post) transmitted computer programs from the top of the building, which could be received by computers throughout the whole town. Meanwhile, Hungarian Radio also transmitted programs codes as audio sounds.

Csokonai was also an important gathering point for the Hungarian swappers and early demoscene groups. The first releases of imported games were often presented in the club. In the 1990s, the club was also the birthplace of Hungarian game journalism; magazines such as *Guru*, *576 Kilobyte*, and the short-lived *Computer Mania* were formed in the club. However, during the second half of the late 1980s, the most important and pioneering gaming journals were *Commodore Világ* and *Spectrum Világ*. These two gaming journals were famous due to the cynical yet paternal voice of the editor of the correspondence column, László Kiss, also known as CoVboy, who became a legendary figure in Hungarian video game culture.

The probable reason for the absence of a major game development company in Hungary today is the shortage of game development courses. Another problem for indie developers is that it is difficult to apply for a Kickstarter campaign: for that, the company is required to be registered abroad. However, the success of Zadbox Entertainment's *Myst* clone *Quern—Undying Thoughts* (2016) and Possible Games' award-winning exploratory musical game *Adventures of Poco Eco: Lost Sounds* (2015) proved that there is room for indie developers. And esports are also gaining popularity; in 2018, the first Hungarian National eSport championship took place. The annual gameshow PlayIT is held in Hungary, and there is also a very strong retro community and culture in Hungary. The Budapest Pinball Museum, which includes various arcade games, is one of the highlights of the city and one of the biggest pinball museums in Europe. Arcadia is one of the biggest retro-exhibitions organized by the Pinball Museum, and another huge annual party, called PixelCon, is organized by the Insert Coin Association. In Csokonai, there are also various retrogame exhibitions, such as Regamex, organized by Gábor Szakács (also known as "Sakman"), who is one of the main collectors of classic computers, consoles, and quartz games in Hungary.

Hungarian video games have a rather special history. During the 1980s, a new industry was born and flourished unequaled in Eastern Bloc countries. In the 1990s, smaller companies raised and produced mainly role-playing games (RPGs) and real-time strategy (RTS) games for the Western market. Although during the 2000s the industry declined, a few companies started to focus on producing trailers and cinematics. Nowadays, new smaller independent software houses are appearing. The knowledge and the creativity is still there, so we may see breakthroughs in the near future.

Tamás Beregi

See also: Demoscenes

Further Reading

Beregi, Tamás. "Hungary." In *Video Games around the World*, edited by Mark J. P. Wolf, 219–234. Cambridge, MA: MIT Press, 2015.

Beregi, Tamás. *Pixelhősök: A számítógépes játékok első ötven éve*. Budapest, Hungary: Vince Kiadó, 2010.

I

I, Robot

Atari's *I, Robot* (1983) is a historically significant, but largely unknown, video arcade game. The game was designed and programmed by Dave Theurer, who also created *Missile Command* (1980) and *Tempest* (1981), and Dave Sherman designed the arcade system. Although an abstract game, *I, Robot* combined various elements of different game genres, resulting in unique and difficult gameplay for its time. It was the first game to feature three-dimensional filled-polygon graphics rendered and manipulated in real time as well as an interactive camera system that could change the player's point of view during gameplay (players also received more points for closer viewing angles).

The game's title is a reference to the Isaac Asimov science fiction novel of the same name, the story of which was inspired by George Orwell's novel *Nineteen Eighty-Four* (1949). The player personifies Interface Robot #1984, an unhappy robot that rebels against the totalitarian power of Big Brother and his Evil Eyes. In his world, every part of the field is watched over by a giant Eye that executes a simple and relentless law: if the player's avatar jumps while the Eye is open, the Eye annihilates it. The robot must then travel through a labyrinthine structure, recolorizing the platforms to destroy the Eye. The robot must also avoid traps and projectiles while firing at enemies with a laser weapon. After defeating the Eye, the robot jumps into a spatial void for a shooting sequence before reaching the next level. The game contains 126 levels (the two-digit counter only goes to 99, displaying the next levels as 00–26), looping through 26 distinctive level designs with additional gameplay mechanics, faster pace, and different colors. At the entrance of certain levels is a teleporter that allows the robot to go directly to a level previously achieved. The game features a tutorial in the attract mode and includes a recreational mode called Doodle City, which allows the player to view and manipulate three-dimensional forms.

Despite *I, Robot*'s conceptual and visual innovations, the game was a commercial failure, with around a thousand units produced. Perhaps it was too complex and advanced for the general public at the time. Critics and historians have since reevaluated this underappreciated title because of its position in video game history. *I, Robot* remains an arcade collector's item and is available for emulators.

Martin Picard

See also: Dimensionality; Graphics

Further Reading

Buchanan, Levi. "The Revolution of *I, Robot*." IGN Retro website, August 28, 2008. Available at http://retro.ign.com/articles/906/906161p1.html.

Burnham, Van. *Supercade: A Visual History of the Video Game Age, 1971–1984*. Cambridge, MA: MIT Press, 2001.

"Video Game Flyer: *I, Robot*." The Arcade Flyer Archive website. Accessed September 19, 2020. Available at http://www.arcadeflyers.com/?page = thumbs&db = videodb&id = 520.

Iceland

The Icelandic game industry began to grow after the financial crisis of 2008. Many factors influenced this rise. First, the crisis had weakened the banks, where most of the information technology professionals worked, leaving many unemployed. Second, the government was searching for a way to bring economic hope for the country. The game industry represented a way to export Icelandic products despite the country's lack of natural resources. The government and the media helped the game-related industry as a way to bring employment to the banks' former employees and to reinforce the economy. Third, the rise of the international mobile gaming market made it easier for start-ups in the game industry, as these games cost less and are quicker to produce.

In 2005, video games represented an ISK 1.9 billion (Íslensk króna, or Icelandic crowns) industry for Iceland, and in 2009, its value was ISK 13.2 billion. Since then, the game-related industry is still growing rapidly in Iceland: between 2008 and 2015, the average yearly growth value was 18 percent. Most of the game-related revenues in Iceland come from exports. According to Hilmar Veigar Pétursson, the director of the most important Icelandic video game developer, CCP Games, video game exports have been growing faster in Iceland than in other countries (Fontaine 2011).

The award-winning CCP Games, founded in 1997 by Reynir Harðarson, Þórólfur Beck Kristjónsson, and Ívar Kristjánsson, published *EVE Online* in 2003, after funding it with a very popular board game called *Hættuspil* (or "Danger Game"). *EVE Online* is a space-themed persistent world, and it is one of the biggest massively multiplayer online role-playing games (MMORPGs). The company is based in Reykjavík, but it has studios in China and in the United Kingdom. It also has studios in the United States, but they were closed in 2014 (San Francisco) and 2017 (Atlanta). In 2018, CCP was acquired by the South Korean video game publisher Pearl Abyss.

Iceland also has many smaller game developers that (along with CCP Games) have taken part in the Icelandic Game Industry (IGI) since September 2009. The IGI organizes regular meetings, conferences, and other game-related activities. Also, in 2018, Game Makers Iceland (GMI) officially began its activities (though it had worked with IGI prior to 2018). GMI is an organization that brings together game developers, students, and game players in their monthly meetings, game jams, and other networking events.

Despite its small population (357,050 as of December 31, 2018), Iceland has a strong gaming culture. The country has some professional players and esports teams. As of 2018, the most popular esports game in Iceland is Valve's *Counter-Strike* (2000) followed by Blizzard Entertainment's *Overwatch* (2016). Some conventions in relation to video games and the gaming culture also take place in Iceland. The Midgard Convention regroups fans, gamers, and geeks of many media, including video games. The EVE Fanfest attracts gamers of *EVE Online* (and other CCP games in the same imaginary world) from all over the world.

Laura Iseut Lafrance St-Martin

Further Reading

Fontaine, Paul. "Iceland's Biggest Growing Export: Video Games." *The Reyjavik Grapevine*, May 3, 2011. Available at https://grapevine.is/news/2011/05/03/icelands-biggest-growing-export-video-games/.

Game Makers Iceland (GMI) website. 2019. Available at https://web.archive.org/web/20160804204444if_/https://grapevine.is/news/2011/05/03/icelands-biggest-growing-export-video-games/.

Icelandic Game Industry (IGI) website. Accessed September 19, 2020. Available at http://igi.is/.

Ragnarsson, Ólafur Andri. "How to Create a Gaming Industry: The Story of the Icelandic Gaming Industry." May 3, 2012. Available at https://www.olafurandri.com/category/icelandic-gaming-industry/.

id Software

id Software is an American video game developer that was founded on February 1, 1991, by programmers John Romero and John Carmack, game designer Tom Hall, and artist Adrian Carmack (no relation to John). They met while developing video games (including *Dangerous Dave* [1988]) for Softdisk, a magazine-on-disk company. When Scott Miller, the founder of video game publisher Apogee Software, asked Romero to produce a shareware game, Romero gathered Carmack, Hall, and Carmack as well as project director Jay Wilbur and artist Kevin Cloud to work on the project. Hall designed their first game, and three months later *Commander Keen: Invasion of the Vorticons* (1990) was ready. A month later, the group received a $10,500 royalty check because of Miller's innovative selling strategy in which only a part of the game was free; the players had to buy the rest of the game if they wanted to continue. After that success, they founded id Software, named after the Freudian concept of the "id," the primal level of the human psyche, and set up its headquarters in Mesquite, Texas.

After *Commander Keen*, id Software released several small games published by Softdisk, including *Hovertank One* (1991) and *Catacombs 3D* (1991). Those two games used the three-dimensional graphics game engine created by John Carmack. Miller asked them to create a three-dimensional shareware game using this technology, and the result was id Software's third three-dimensional game, *Wolfenstein 3D* (1992), a first-person shooter (FPS) that takes place in a Nazi stronghold and helped establish the FPS genre.

id Software's *Rage* booth and logo at E3 2011 in Los Angeles, California. (Antonio Jodice/ Dreamstime.com)

Following *Wolfenstein* (and its sequel, *Spear of Destiny* [1992]), id Software produced another FPS called *DOOM* (1993). *DOOM* used a powerful new game engine, also developed by Carmack, and was the first local area network (LAN) game that could be played simultaneously by four players (in a cooperative mode or a "death match" mode). It rapidly became a big success that influenced the game industry, and many *DOOM*-like games soon followed. Later, the team stopped publishing with Apogee and became independent. id Software used the business model developed by Miller and gave away the first part of *DOOM* as shareware and sold the rest of the game directly. A long-lasting collaboration started between the company and the players' community that created game modifications and levels. id Software would later produce many sequels: *DOOM II: Hell on Earth* (1994), *DOOM 3* (2004), *DOOM II RPG* (2009), *DOOM* (2016), *DOOM VFR* (2017), and *DOOM Eternal* (2020).

Following the success of *DOOM*, using the same business model, id Software launched *Quake* (1996), another FPS. It was one of the first set in a real three-dimensional environment, which was also successful. After *Quake*, Romero left the team, but id Software continued to produce the multiplayer *Quake II* (1997), *Quake III Arena* (1999), and *Quake III: Team Arena* (2000), building improvements into the *Quake* engine. The *Quake* engine was also used by other games, such as the well-known *Half-Life* (1998).

id Software was also involved in the production of other games, including *Heretic* (Raven Software, 1994), *Hexen I* and *II* (Raven Software, 1995 and 1997, respectively), *Return to Castle Wolfenstein* (Gray Matter Interactive and Nerved Software, 2001), *Orcs & Elves* (Fountainhead Entertainment, 2006), and *DOOM Resurrection* (Escalation Studios, 2009). In June 2009, id Software was bought by ZeniMax Media, a video game holding company that also owns Bethesda. Since then, they have worked on many games published by Bethesda Softworks. In 2015, id Software opened another studio in Frankfurt.

In 2013, John Carmack (who had developed every "id Tech" game engine) quit id Software to join the Oculus team. The game engines are an important part of the popularity of id Software's games as well as the prestige associated with the company. More precisely, id Software is renowned for being the primary reason the concept of *game engine* was developed in the early 1990s, boosting the pace of innovative technology for PC games. Since then, John Carmack has been replaced by Tiago Sousa; he worked on id Tech 6, which was released in 2016 in *DOOM* (2016). As of 2019, id Software was working on *Rage 2,* which will include a new engine, id Tech 7.

Maude Bonenfant

See also: *DOOM*

Further Reading

Demaria, Rusel, and Johnny L. Wilson. *High Score! The Illustrated History of Electronic Games*. Berkeley, CA: McGraw Hill/Osborne, 2002.

Kushner, David. *Masters of Doom: How Two Guys Created an Empire and Transformed Pop Culture*. New York: Random House, 2003.

Idea for Home Video Games

As a TV engineer working on the design of a TV set at Loral in 1951, I suggested adding some form of interaction of the viewer with the screen. Management turned me down. I thought it was a good idea. They did not, and that was that.

The idea did not resurface until 1966. By that time, I had moved up the ranks from engineer to a divisional manager's job at Sanders Associates, then a very large defense electronics company in New Hampshire. My division worked on radar countermeasures and sonar systems. Television technology was not involved. But my television engineering degree and TV experience did not just vanish.

The thought of some forty or fifty million TV sets then in the United States alone kept bugging me to come up with something that could be attached to them, something that might be fun to use and low in cost—but what? In New York on business on the last day of August in 1966, I had an epiphany. How about attaching something to the antenna terminals of a TV set that would allow people to play interactive games? When I got back to my office in New Hampshire, I sat down and wrote a four-page disclosure document. In it, I proposed building a small device that would allow people to play games by controlling very simple images, actually just small "spots" on the screen of their TV sets, to play a variety of games. I listed some imitative of board games and others that involved “chases,” where one player tried to have his or her spot catch up with and wipe out another player’s spot. Car races and various sports games were all described in some detail. I had one of my engineers sign and date each page. Little did I know that what had just transpired was the birth of the home video game industry. But still, I was just at the what-if stage then.

Fortunately, I had some five hundred engineers, technicians, and support persons working for me at the time. Putting someone, a technician or an engineer, to work on a skunk works project for a few weeks was no big deal; it would not even ripple my division’s overhead.

Bill Harrison, one of the technicians in my division, and I hooked up some circuitry and soon found inexpensive ways to build elementary games. Among these was a light gun for shooting at a target spot on the screen and wiping it off with a “hit”; we built some chase games—one spot chasing another and wiping it off the screen upon contact—and a few board games. That done, it was time to go public to get some official funding needed to carry on the development work. Video games had absolutely nothing to do with anything the company was doing. Convincing management to let me spend more money on that strange concept required a leap of faith on their part. They trusted me—grudgingly.

The demo went off well enough, and I got some conditional support to continue “working on this stuff.” A couple of thousand dollars was all I received, but it made the work official. We went through a sequence of seven developmental models that gave us ever more capability for playing neat games. By November 1967, ball-and-paddle games were functional: ping-pong and handball games were working, and there was no looking back after that. We knew that we had broken the code. We had something that was a lot of fun. Having only worked on the project off and on, we were almost into 1969 by then. Unit No. 7, our multigame system, was called the “Brown Box” because we had covered the unit with walnut-decorated contact paper to dress it up a bit. Who could have known that the Brown Box would someday wind up on permanent display in the Smithsonian?

There was no way Sanders Associates could build and market consumer products, so licensing was the proper route for the home video game. We first tried to get TelePrompter, then the largest U.S. cable network, to put on interactive programming that could be accessed by our Brown Box. TelePrompter was enthusiastic; however, the cable business was in deep trouble, and our negotiations went nowhere. It finally dawned on me that TV set manufacturers such as RCA, Philco, Zenith, Motorola, and Magnavox were our most likely prospects. They had the engineering, production, marketing, and distribution needed to carry this concept forward. And, yes, we manufactured all of our TV sets in the United States back then.

Magnavox took the chance to spend a million dollars on production engineering our Brown Box, conducting customer acceptance tests all over the country and committing the company to produce games for sale before and into the 1972 Christmas season. The game was called the Odyssey. Magnavox dealerships were shown early models in May 1972. Advertising started in the summer, and close to one hundred thousand Odysseys were in people’s homes by New Year’s Day of 1973. For the next two years, Odyssey was the only home video game in town. There was a video game industry now where none had been before.

In 1971, Nolan Bushnell, later the president of Atari, was working on *Computer Space*, an arcade video game version of *Spacewar!* (1962). The game was not successful. He played Odyssey's ping-pong game at a Magnavox dealership demonstration in May 1972. The simplicity and great gameplay of the game motivated him to change gears. He brought Alan Alcorn on board to develop a coin-op version, which they named *PONG* (1972). It became very successful in 1973 and started the arcade video game industry.

So that is what happened to the idea of "What if we made a gadget that allows people to play games on their TV sets?" Some 350,000 Odysseys were sold by early 1975. Millions of newer versions would follow. The rest is history.

Ralph H. Baer

See also: Magnavox Odyssey

Further Reading

Baer, Ralph H. *Videogames: In the Beginning*. Springfield, NJ: Rolenta Press, 2005.

Immersion

Dictionaries commonly recognize two main uses for the term *immersion*: (1) it is the physical absorption of something into some substance, and (2) there is the more figurative use of absorbing involvement, such as learning a language through immersion. The term is also an important concept in gamers' speech, where it gains several special meanings.

The experience of being immersed in a game appears to relate to both of these dictionary meanings of the term. Most contemporary digital games create an illusion of virtual space in which players enact gameplay activities. This sense of being transported to "another place" while using digital technology has been studied in the fields of communication studies and human-computer interaction (HCI) under the concept of *presence*. Such immersion can be examined by looking at the degree to which a player's perceptions are focused on the virtual world and the degree to which perceptions related to the physical environment are "shut out" (Lombard and Ditton 1997; Patrick et al. 2000).

Not all immersion is a direct consequence of being absorbed in sensory perceptions; even simple games without spectacular user interfaces can be very engaging because mental aspects of gameplay can also be immersive for players. Challenges and action are core elements of games (and, indeed, one of their defining characteristics), and engagement or absorption in action is an important part of game-related immersion. Studies based on game player interviews have tried to extract the meaning of *immersion* by asking what it means for the players themselves (Brown and Cairns 2004; Ermi and Mäyrä 2005). Effort and attention directed toward a game appear to be important in keeping players involved. Immersive games absorb players completely and tax their various faculties, which range from motor skills, navigation, and cognitive problem-solving to social and emotional involvement. Immersion, however, is not necessarily a measurement of how “good” a game is; some players prefer powerfully immersive experiences, whereas others prefer games that are casual and nonimmersive.

The phenomenon of enjoyable absorption in action, called “flow” by psychologist Mihaly Csikszentmihalyi, is an “optimal experience” that can occur at the moment of perfect balance between the challenge of the task and the skills of the person. Feelings of powerful gratification and losing one’s sense of time are often associated with flow experiences. Because typical gameplay is not as free of disruptions and breaks as the ecstatic performances that Csikszentmihalyi describes, immersive gameplay appears related to flow, yet it is also different.

Sweetser and Wyeth (2005), who have developed a model of “GameFlow,” include in it eight elements that relate to player enjoyment: concentration, challenge, skills, control, clear goals, feedback, immersion, and social interaction. Thus, the experience of flow often appears to be a part of immersion, whereas immersion is also a part of “gameflow”; analyses of immersion seem to lead to circularity. Nevertheless, analysts seem to agree that immersion denotes the degree of the player’s involvement with the game. Ermi and Mäyrä (2005) have further divided gameplay immersion into three main dimensions: immersion into challenges and action, sensory immersion, and imaginative immersion. The experience of immersion in the playful challenge of a game appears unique to games, whereas sensory immersion also occurs in the visual arts and cinema; imaginative immersion has long been known and studied as the kind of immersion that takes place while reading engaging literature (Ryan 2001).

Facing the complexities in defining the different aspects of gameplay immersion, some game scholars have recommended avoiding it altogether and using other more clearly definable concepts instead (e.g., Calleja 2011). On the other hand, immersion remains a useful concept in multiple studies looking, for example, into physical and cognitive engagement in mixed reality games (Hu et al. 2016) and in comparing the different components of player experiences in using educational games (Hamari et al. 2016).

Frans Mäyrä

See also: Contemplative Games; Emotion

Further Reading

Brown, E., and P. Cairns. “A Grounded Investigation of Game Immersion.” In *CHI ’04 Extended Abstracts on Human Factors in Computing Systems*, 1297–1300. Vienna, Austria: Association for Computing Machinery, 2004.

Calleja, Gordon. *In-Game: From Immersion to Incorporation*. Cambridge, MA: MIT Press, 2011.

Csikszentmihalyi, M. *Flow: The Psychology of Optimal Experience*. New York: Harper Perennial, 1991.

Ermi, L., and F. Mäyrä. “Fundamental Components of the Gameplay Experience: Analysing Immersion.” In *Changing Views: Worlds in Play*. Vancouver, Canada: Simon Fraser University, 2005. Available at http://www.digra.org/dl/db/06276.41516.pdf.

Hamari, J., D. J. Shernoff, E. Rowe, B. Coller, J. Asbell-Clarke, and T. Edwards. "Challenging Games Help Students Learn: An Empirical Study on Engagement, Flow and Immersion in Game-Based Learning." *Computers in Human Behavior* 54 (2016): 170–179.

Hu, G., N. Bin Hannan, K. Tearo, A. Bastos, and D. Reilly. "Doing while Thinking: Physical and Cognitive Engagement and Immersion in Mixed Reality Games." In *Proceedings of the 2016 ACM Conference on Designing Interactive Systems*, 947–958. New York: ACM, 2016.

Lombard, M., and T. Ditton. "At the Heart of It All: The Concept of Presence." *Journal of Computer Mediated Communication* 3, no. 2 (1997). Available at https://doi.org/10.1111/j.1083-6101.1997.tb00072.x.

Patrick, E., D. Cosgrove, A. Slavkovic, J. A. Rode, T. Verratti, and G. Chiselko. "Using a Large Projection Screen as an Alternative to Head-Mounted Displays for Virtual Environments." In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 478–485. The Hague, Netherlands: Association for Computing Machinery, 2000.

Ryan, Marie-Laure. *Narrative as Virtual Reality: Immersion and Interactivity in Literature and Electronic Media*. Baltimore, MD: Johns Hopkins University Press, 2001.

Sweetser, P., and P. Wyeth. "GameFlow: A Model for Evaluating Player Enjoyment in Games." *Computer Entertainment* 3, no. 3 (2005): 3.

Immersion v. Sony

In 2002, Immersion Corp., a developer of touch feedback technology, sued Sony Computer Entertainment Inc. (SCEI), Sony Computer Entertainment America, and Microsoft for patent infringement regarding vibration technology in the DualShock game controllers for PlayStation consoles. Microsoft settled out of court and then licensed the technology and bought a 10 percent share of Immersion.

Sony continued to defend its position but lost, and the jury awarded immersion $82 million, which came to $90.7 million once interest and other costs were factored in. Sony was also ordered to suspend sales of the controllers using the technology, a demand that they appealed, selling the products while the appeal was being heard, but in the end, they lost the appeal. In 2006, Sony finally announced that the PlayStation 3 controller would not use the technology, though they gave a technical reason for doing so and did not relate it to the lawsuit.

In 2007, Immersion and Sony announced that they agreed to conclude their case, and they have entered into a new business agreement that will allow Sony to explore the use of Immersion's patents in PlayStation products. According to Immersion's CEO, Victor Viegas, "Our new business agreement with Sony Computer Entertainment is specifically intended to enable advanced vibration capability for the benefit of the PlayStation gaming community. We are happy to provide our technology in this regard and hope to make technical proposals very soon with respect to use of our technology in the PlayStation products" (A&R Edelman 2007).

In 2014, another dispute arose between the companies in regard to whether the DualShock 4 controllers infringe on one of Immersion's Japanese patents ("Immersion Corp." 2016). In 2015, the court ruled in favor of Immersion. Sony opposed the award, but its motion was denied. The award was confirmed, and Immersion won the case.

Mark J. P. Wolf

Further Reading

A&R Edelman. "Immersion and Sony Computer Entertainment Conclude Litigation and Enter into Business Agreement." Press Release for Immersion Corp., March 1, 2007. Available at https://www.sie.com/en/corporate/release/2007/070302.html.

"Immersion Corp. v. Sony Computer Entertainment Am." Leagle.com, 2016. Available at https://www.leagle.com/decision/infdco20160520a00.

"*Immersion v. Sony*." Wikipedia. Last edited January 22, 2020. Available at https://en.wikipedia.org/wiki/Immersion_v._Sony.

Williams, Martyn. "Sony Loses PlayStation Patent Case, Must Pay $91M." *MacWorld*, originally published in *PC World*, March 28, 2005. Available at https://www.macworld.com/article/1043899/immersion.html.

Incremental Games

Incremental games, also known as *idle games* or *clicker games*, are a genre of video games that are typically casual and feature some kind of continual leveling up or accumulation mechanic. They also frequently provide some kind of automated gameplay (thus the moniker "idle"). They are most commonly mobile games, but they are often web based and occasionally PC based.

As with many game genres, the exact origin of incremental video games is a matter of judgment. One of the earliest titles is Eric Fredricksen's role-playing game (RPG) parody *Progress Quest* (2002) in which the player creates a ridiculous fantasy-themed character and then does nothing but watch the gameplay through a series of stereotypical RPG encounters. Ian Bogost's satirical *Cow Clicker* (2010), a critique of Facebook games, simply allowed a player to click a cow once every six hours to accumulate clicks and was another widely played early incremental game.

In 2013, however, a series of successful online games brought the genre to widespread attention. The first was *Candy Box!*, which was released in April by a French student going by the pseudonym "Aniwey." This browser-based game has the player constantly collecting candy, features simple ASCII art, and has a basic RPG-style narrative. *A Dark Room*, released in June by the indie studio Doublespeak Games, is a text/ASCII art game with a somewhat more complex narrative, but it also features a continual accumulation of resources. The big breakthrough title, however, was Julien Thiennot's *Cookie Clicker*, which came out in October and garnered widespread attention. This game has very little narrative but features the common incremental game structure of economic growth (in this case, producing cookies) that leads to ever greater growth: as the player purchases production upgrades (grandmas in the kitchen leads to cookie farms, which lead to cookie mines, which lead to cookie factories, etc.), production rapidly accelerates.

After 2013, the genre grew rapidly, moving into mobile space and diversifying; there are many thematic and mechanical variations within the genre of incremental games. Many incremental games, such as *A Dark Room*, feature somewhat elaborate narratives, while many more have a kind of minimal narrative theme or very simplistic plots, such as the mobile game *Idle Apocalypse* (2018). Many incremental games have RPG elements, such as characters with increasing stats, quests, and fantasy-themed creatures, such as *Idle Heroes* (2016). Economic simulation elements are also common in incremental games, such as *Adventure Capitalist* (2014) or *Idle Miner Tycoon* (2016). There are also many different game mechanics, from simple clicking (used in just about every game), to investment in upgrades (e.g., *Egg Inc* [2016]), to arcade-like combat (e.g., *Idle Invaders* [2017]), to managing complex loops or ratios (e.g., *Idle Loops* [2018]).

Across this tremendous diversity of games, the only thing that is truly constant is that all examples of the genre feature continually increasing numbers with relatively little player input. How these numbers increase and to what end varies widely, but they always increase. And practically all of them allow the player to let the game continue running without much input. More complicated incremental games permit relatively complex player involvement, but even these games can continue running up resources, points, or currency if the player leaves them alone.

In general, incremental games are relatively inexpensive to produce, and most of them do not have the graphical sophistication of a typical triple-A title. Web-based incremental games, such as *Universal Paperclips* (2017), frequently have no images, just text or buttons. Incremental games designed for iOS or Android mobile platforms, such as *Idle Heroes*, tend to be more richly illustrated, but they are still far more visually simple than the hyper-realistic big-budget releases for the game console and PC markets. As such, while some incremental games are commercially successful (typically relying on a free-to-play [F2P] business model), the genre is full of many experiments released completely for free, often with no real possibility of the creator making any money from them.

The long-term cultural impact of the genre is still uncertain. Individual incremental games have received some media attention, and a few articles and websites discuss or curate examples of the genre as a whole; however, by and large, outside of its appearance in the mass market around 2014 and 2015, incremental games do not garner much publicity.

Kevin Schut

See also: Free-to-Play Model

Further Reading

King, Alexander. “Numbers Getting Bigger: What Are Incremental Games, and Why Are They Fun?” Envatotuts+, May 22, 2015. Available at https://gamedevelopment.tutsplus.com/articles/numbers-getting-bigger-what-are-incremental-games-and-why-are-they-fun--cms-23925.

Le Conte, Aaron. "Idle Games, Everything You Need to Know!" Mobilefreetoplay, November 20, 2018. Available at https://mobilefreetoplay.com/idle-games-everything-you-need-to-know/.

Thomsen, Michael. "*A Dark Room*: The Best-Selling Game That No One Can Explain." *The New Yorker*, June 11, 2014. Available at https://www.newyorker.com/tech/annals-of-technology/a-dark-room-the-best-selling-game-that-no-one-can-explain.

India

Since the boom in its information technology (IT) industry in the 1990s and its popularity as a location for foreign direct investment, India is now seen as a major potential player in the video game industry. However, despite its population of over a billion people, its rich ludic culture, its increasing number of computer users, and its prosperous entertainment industry, the inroads made by video games seem to be very minimal.

Due to the wide economic disparity, video games are restricted to the wealthier sections of society, although there are ongoing attempts use games as a teaching medium, mainly for children from deprived families. Other problems are piracy and the relative youth of the IT industry. Despite this, the industry has shown great potential for growth with the recent surge in the number of internet users and the amount of disposable income. The main market is PC based and mobile based, but consoles are beginning to catch up. Indian game designers contribute to the worldwide industry by working for such giants as Sony, Rockstar Games, Ubisoft, Zynga, and Electronic Arts (EA), but they have also started creating their own titles and studios.

A 2007 study by market researcher ICube revealed that only 5 percent of India's forty-two million internet users were active gamers. This has changed significantly, and a revenue of 11.9 billion rupees (USD 1.3 billion) is predicted for the year 2023, according to a report by KPMG and Indian Federation of Sports Gaming published in March 2019. According to the *Economic Times*, the typical Indian gamer is male, has an average age of twenty-six, and belongs to an affluent family from a major metro area. Casual games are by far the most popular; the community of hardcore gamers (defined as those gaming for over four to six hours a week) is limited to about 2–3 percent of the gaming population. Home computers and mobile phones are popular gaming devices, but consoles such as the Microsoft Xbox 360 and the PlayStation 3 and 4 are gaining popularity. Although the Nintendo Wii has not been officially released in India, the PlayStation Move was released in September 2010. Other systems, such as the low-priced console Zeebo, and gaming via set-top boxes have been in the pipeline. Zeebo, described by its California-based developers as a "the world's most affordable platform," is aimed at emerging markets, such as Brazil, Mexico, India, and China, but was never released in India despite the initial promise. Although virtual reality (VR) headsets still remain out of reach for the middle-class Indian, HTC Vive and PlayStation VR are popular draws in shopping malls and arcades.

Indian places and characters have featured in video games. For example, Dhalsim, the yogic fighter in *Street Fighter II* (1991), is Indian. Some of the action in *No One Lives Forever 2: A Spy in H.A.R.M.'s Way* (2002) takes place in the bylanes of Calcutta. In *Fallout 3* (2008), there are some Indian name references, and the "Brahmin" cattle is one of the more controversial ones (Microsoft did not release the game in India because of "cultural sensitivity" issues). The *Empire: Total War* (2009) game and an *Age of Empires 3* (2007) expansion also feature India. First-person shooter (FPS) games such as *Call of Duty: Modern Warfare 3* (2011) also have levels that are set in India.

There is a growing market for indigenously developed games. Sony's *Hanuman: Boy Warrior* (2009) has provoked controversy among some religious groups; however, it is a novel attempt to bring Indian folklore into video games. More recently, *Unrest* (2014), developed by Pyrodactyl Studios, has attempted to create a role-playing game (RPG) based in the mythical past of Indian folklore. Other games, mostly developed for mobile phones, tap into Bollywood, such as *Dhoom 2.5* (2008) and *Ghajini* (2009), both created after blockbuster films of the same names. Sports games are also very popular. Finally, there are some distinctly innovative games, such as *Finger Footie* (2010) and *The Great Indian Arranged Marriage* (2007). Some of the leading development studios are FX Labs, Indiagames, Dhruva Interactive, Jump Games, and Kreeda.

Recently, indie game studios and their games have come into the limelight. Yellow Monkey Studios' *Huebrix* (2014), HashTash's *Circulets* (2014), and Rolocule's *Flick Tennis* (2012) are some of the titles that have made a mark in the iOS store or on the Android platform. In 2017, *Missing* (2017), a game addressing human trafficking in Kolkata's red-light area, became the first Indian video game to address a social issue.

Gaming is fast becoming popular in India, and from gaming events hosted by corporations such as Gillette and Reliance India to the games played in cybercafés in Indian suburbs, there is much excitement. Examples of popular gaming championships are the Gamebox Championship 2007, the India Gaming Championship 2010, and the *Skoar!* regional tournaments. *Skoar!* is India's only surviving printed gaming magazine, but it exists as a section of the *Digit* magazine published by Jasubhai Media and also in a web-based version. There are quite a few game-related webzines and blogs, such as *NDTV Gadgets TAG* run by Rishi Alwani and *Indian Noob*.

Online gaming portals such as Zapak and Games2Win remain quite popular. Kreeda.com has launched a multiplayer online dance game called *Dance Mela* (2007). Augmented reality (AR) games such as *Pokémon GO* (2016) saw a considerable surge in popularity around 2017 but were taken off the Indian streets shortly after. In 2019, the multiplayer game *Player Unknown's BattleGrounds* (2017), better known as *PUBG*, became extremely popular and has been an issue of contention recently, with the police banning it in Gujarat and arresting *PUBG* players.

Online gaming has seen a surge in India with the introduction of the 4G networks across the metropolitan cities, but it has, arguably, arrived with a slew of problems. Popular board games, such as Ludo, are now reemerging in their virtual forms; Gametion's *Ludo King* (2016) has become the first Indian game with over one hundred million downloads. Both Chinese companies (Tencent and Youzu) and Indian investors (PayTM, Alibaba, and Reliance) are eyeing the promising casual games market.

Game design is still quite new in the Indian academic world. Usually, leading design institutes such as the National Institute of Design offer courses. New institutions are up and coming, such as the DSK Supinfocom Pune, which promise to bring world-class game design education to India. Other academic disciplines in India are yet to forge links with video game studies in the same way as in countries with a developed video game industry. Leading game designer and writer, Ernest Adams, has also visited India and conducted workshops. Adrienne Shaw and Casey O'Donnell have both spent some time in South India and have written about their experiences of the region. O'Donnell's book, *Developer's Dilemma: The Secret World of Videogame Creators* (2014), contains a comparative analysis of the game industry in India and the United States.

The video game industry in India is nascent but developing quickly. With a vast potential for growth and diversification, it can be seen as a sleeping giant. As Adams (2009) comments, "India has the talent, the resources, and the attitudes required to become a major player in this industry. All [they are] lacking is experience, and that will come with training and time."

Souvik Mukherjee

Further Reading

Adams, Ernest. "The Promise of India: Ancient Culture, Modern Game Design." NASSCOM Animation and Gaming Summit 2009, Hyderabad, India, November 5–7, 2009. Available at http://www.designersnotebook.com/Lectures/India/india.htm.

Gadgets 360. Accessed September 20, 2020. Available at https://gadgets.ndtv.com/authors/rishi-alwani-11.

Mukherjee, Souvik. "India." In *Video Games around the World,* edited by Mark J.P. Wolf, 235–247. Cambridge, MA: MIT Press, 2015.

Mukherjee, Souvik. *Videogames and Postcolonialism: The Empire Plays Back*. Basingstoke, England: Springer UK, 2017.

O'Donnell, Casey. *Developer's Dilemma: The Secret World of Videogame Developers*. Cambridge, MA: MIT Press, 2014.

Shaw, Adrienne. "How Do You Say Gamer in Hindi?: Exploratory Research on the Indian Digital Game Industry and Culture." In *Gaming Globally: Production, Play and Place*, edited by Nina Huntemann and Ben Aslinger, 183–201. New York: Palgrave Macmillan, 2013.

Skoar! website. Available at https://www.digit.in/gaming/.

Tech Desk. "In India, Online Gaming Industry Could Generate Rs 11,900 Crore in Revenue by 2023: KPMG Report." *Indian Express*, March 7, 2019. Available at https://indianexpress.com/article/technology/gaming/in-india-esports-could-generate-rs-11900-crore-in-revenue-by-2023-5614363/.

Indonesia

With a population of more than 237 million, Indonesia is a big market for the video game industry. As of 2017, 54.13 percent of 143.26 million internet users in Indonesia used the internet to access online games. However, the Indonesian Agency for Creative Economy estimates there are 43.7 million gamers in Indonesia. The numbers show a significant increase of online gamers compared to 2012 data that estimated 7–10 million users. In 2012, the Indonesian government initiated a program to stimulate the creative industry with a budget allocation of 900 billion Indonesian rupiahs (USD 100,000,000). This initiative aimed to respond to a growing market of video games mostly dominated by foreign products. The budget includes allocations to support local interactive game industries among the fourteen subsectors for which the funding is allocated. In parallel, the Ministry of Higher Education commissioned students to carry out research to develop local content that can be used by Indonesian gamers. With an estimation that creative games and animation contributed 7 percent of the country's gross domestic product (GDP) in 2011, the industry is significant for the state's economy. The market is still growing, with 2017's revenue of 12.3 trillion rupiahs (USD 880 million) and is estimated to reach 55.5 trillion Indonesian rupiahs (USD 3.75 billion) by the year 2022.

The year 2013 was a milestone for the gaming industry in Indonesia with the formation of the Indonesian Game Association (AGI). The AGI aims to provide a networking platform among video game developers and its subsector that includes an intermediary between gaming industries and the Indonesian government.

The history of Indonesia's video game industry began in the 1980s with the introduction of arcades and home consoles to the domestic market. The Atari VCS 2600 was the first console system available in Indonesia, followed not long after by Nintendo's and Casio's Game & Watch series. In the largest cities and suburban areas, street vendors providing illicit rental services for handheld games made video games more accessible for the middle-to-low income family, and Casio's Game & Watch handheld games became very popular among 1990s youth. The phrase "Game & Watch" evolved into a slang word, *gimbot*, which means "video games" in general. The further development of Indonesia's video game industry then followed by increasing the number of gamers playing personal computer (PC) games, handheld games, and mobile games in the upcoming decades. However, the game console market constantly grew following technological advancements by companies such as Nintendo, Sony Entertainment, Microsoft, and SEGA. Although video games have been in Indonesia since the 1980s, Indonesian game developers only emerged in the early 2000s, along with the growth of the mobile games market.

The culture of video games in Indonesia emerged and developed in a specific class-cultural context and split into two categories. The first category is the video game culture that emerged among those who can afford legitimate home consoles. The second is the video game culture that emerged and developed within the "unregistered" or "grey market culture" of console and arcade rentals. The famous term *dingdong* refers to arcades that were popular among youths of the 1980s and 1990s. Until the 2000s, Indonesia housed one thousand of the fifteen hundred arcade machines distributed by Namco Bandai in the Asian Pacific area. The legal status of arcades made way for them to be integrated into mainstream urban culture and helped sustain gaming practices and consumption despite the development of more technologically advanced games. Since the 1990s, the popularity of home consoles, especially the Sony PlayStation, has boosted the growth of the home console rental industry, including in rural areas and urban slums. The advancement of the internet and mobile devices (such as smartphones) has boosted the popularity and demands of mobile games, so the expanding market targets not only urban youth but also the broader population in terms of age and sociodemographic characteristics. For example, mobile online games such as *Farmville* (2009) were popular among urban housewives in their forties.

Yet, the growth of the console-based video game market in Indonesia was not followed by the production of console-based games by Indonesian developers. This is due to regulatory issues in regard to the importation of development kits. However, entering the second decade of the 2000s, Indonesian-made console games finally emerged. Since 2016, several console-based video games produced by local developers are available in the market, including *Fallen Legion* (2017) by Mintsphere in collaboration with YummyYummyTummy from the United States, *Ultra Space Battle Brawls* (2018) by Mojiken Studios, and *Valthirian Arc: Hero School Story* (2018) by Agate Studio. Lentera, a local game developer, launched *Ghost Parade* (2018) during the 2018 Indonesian Agency for Creative Economy (BEKRAF) Festival. BEKRAF also helped *Ghost Parade* to participate in the 2018 Game Connection America (B2B) event in San Francisco, where BEKRAF and Aksys Games met and started their partnership. As result, *Ghost Parade* was released worldwide on various platforms, including Nintendo Switch, PlayStation 4, and PC, in 2019. Continuing previous attempts to make video games a medium for the promotion of national culture, *Ghost Parade* incorporates traditional myth, folklore, music, and local human and nonhuman characters into its storyline.

The popularity of computer games rose with free-to-play (FTP) games around the early 2000s, such as *Counter-Strike* (1999), *Ragnarok Online* (2002), and *Ayo Dance* (2008) (an Indonesian version of South Korea's *Club Audition* [2007]). As games targeted the domestic market, local publishers localized the content of imported computer games. As an example, the computer game *Special Force* (2004) is set in Indonesia's capital city of Jakarta, showing famous city's landmarks, such as Monas (Monumen Nasional/National Monument). The practice of localizing the content of video games in Indonesia is a strategy often taken by non-Indonesian game developers, not only for console games but also mobile games such as *Harvest Moon* (1996) and *Angry Birds* (2009). In 2018, the multiplayer online battle arena (MOBA) game *Arena of Valor* (produced by Tencent Games) introduced the Indonesian fictional martial arts character Wiro Sableng from the legendary novel series by Bastian Tito. The year before, *Mobile Legends* (2017), produced by Shanghai Moonton Technology Co. Ltd., introduced Gatot Kaca, a fictional character from the Indonesian version of the Mahabarata epics.

The Indonesian president, Susilo Bambang Yudhoyono, launched the massively multiplayer online role-playing game (MMORPG) *Nusantara Online* (2009) during the 2009 Indonesian Creative Products Week (Pekan Produk Kreatif Indonesia/PPKI). *Nusantara Online* is a product of cooperative efforts between state enterprise PT Telekomunikasi Indonesia (Telkom) and game developers

Sangkuriang Studio and PT Nusantara Wahana Komunika. President Yudhoyono mentioned *Nusantara Online* as the product of Indonesia's sons and daughters (*anak bangsa*). Despite endorsment and attention by the government, however, *Nusantara Online* has not been received with much enthusiasm by Indonesian gamers. In 2014, the Indonesian developer Digital Happiness launched a third-person horror game, *Dreadout*, through a crowdsourcing campaign via Indiegogo. *Dreadout*, featured Indonesian settings and influences, including local ghosts, such as tuyul, pocong, and kunti. The game has been adapted into a film, which was released on January 3, 2019.

In the early 2000s, Indonesian game developers were more focused on mobile and online games because they required less financial capital for development compared to console-based and PC-based games. These games were mostly designed to be marketed through popular online platform and application markets, such as Facebook, Ovi Store, iTunes, and Android Market (now Google Play). Two of the largest local game developers are Altermyth Studio, established in 2003, and Agate Studio, established in 2009. Mobile online games provide a great business opportunity for local developers and mobile telecommunication industries. The year 2016 was marked by the success story of the Android-based online game *Tahu Bulat*, produced by Own Games. The game was downloaded by more than 2.5 million users within three weeks after its appearance on Google Play. This success story inspired several mobile game developers to produce other mobile games featuring local content.

The constantly growing market for video games in Indonesia, followed by the emergence of highly skilled talents in the games industry, the advancment of internet technology, and support from the government, will likely enable Indonesia's video game industry to continue to grow into the future.

Rhino Ariefiansyah and Febrian

Further Reading

Rakhmani, Inaya, and Hikmat Darmawan. "Indonesia." In *Video Games around the World*, edited by Mark J. P. Wolf, 249–270. Cambridge, MA: MIT Press, 2015.

Industry

Charted over time, the financial success and social prominence of the video game industry would look something like a roller coaster. Although some of the oldest video game companies have roots that reach back to penny arcades, pinball machines, and other early coin-op entertainments, what we think of as the contemporary video game industry has weathered a series of peaks and valleys through the 1970s, 1980s, and 1990s and led to the current moment in which video games are a significant and expanding segment of the economic and entertainment landscapes. Relying directly on the evolution of computer technology, video games have also played a significant role in driving hardware, software, and distribution innovations.

What is considered to be the first video game is subject to debate (see "First"

Video Game), but two games that are usually credited as the earliest are Willy Higinbotham's 1958 table tennis–like game played on an oscilloscope and Steve Russell's *Spacewar!* (1962), a spaceship duel game made on an MIT mainframe. Although rudimentary by contemporary standards, these two games established numerous trends that would play out over the course of video game history, both in terms of relying on the cutting edge of technology and in looking to contemporary sources for inspiration, such as existing games and sports (e.g., table tennis) or popular culture tropes (e.g., space travel and combat). With the rapid growth of public arcades and the home console market driving sales through the 1970s, early entrants in the video game industry raced to establish footholds in each market segment. Home video game consoles, such as the Magnavox Odyssey, differed significantly from earlier games in that they were compact and widely available to the consumer market compared to games requiring massive mainframe computers that were only available on university campuses or at large corporations. In the coin-op arcade space, Atari, Midway, Namco, Capcom, and others gained early success, with Namco's *Pac-Man* (1980) going on to become the most popular arcade game of all time, eventually selling more than three hundred thousand cabinet units (Kent 2001, xiii).

As momentum shifted to the home console market in the late 1970s, Atari saw the success of the second-generation Atari VCS 2600 console meet competition from new systems from the Magnavox Odyssey console line, the Mattel Intellivision, Coleco's ColecoVision, and other home platforms. However, the rush to establish a marketplace also drove a glut of underdeveloped or derivative games and consoles, leading to a series of boom and bust cycles. In 1977, the overexpansion of home consoles led several manufacturers to sell off their console stock at a loss; for example, Fairchild abandoned its Fairchild Channel F console altogether, and RCA did the same with its Studio II console (see Crash of 1977). Atari, Magnavox, and Coleco emerged from the collapse as the major competitors in the market. However, their market dominance proved short-lived, as the home console market collapsed again in 1983, which is usually attributed to an overabundance of poorly developed games that led to consumer skepticism (see Crash of 1983).

The falloff was dramatic. By 1983, Atari had been sold off from parent company Warner Communications, Mattel had closed its Intellivision division, and Coleco had started a decline that eventually ended in bankruptcy in 1988. A similar fate played out in the arcade market. In 1981, U.S. arcade revenues reached $5 billion (Kent 2001, xiii), but by the middle of the decade, arcades were closing across the country.

Although the early days of the video game industry were dominated by the console and coin-op markets, the late 1970s and early 1980s also saw the birth of two other important segments of the industry: home computer games and handheld games. With the increasing presence of home computers, these games provided an entry point for small, independent developers and publishers to bring their games to market. Many of these games were made available through nontraditional venues such as direct sales through magazines and newsletters. At least one major publisher, Electronic Arts (EA), started as a home computer game developer and publisher before branching into console, handheld, and other platforms. Commonly credited as the innovator of handheld video games, Mattel released its first, *Auto Race*, in 1976, followed by a series of sports simulations and other straightforward action games.

The success of the Mattel games led to numerous competitors, most using LED or LCD screens and containing one game programmed directly into the hardware. One exception was Milton Bradley's Microvision, the first handheld console to use interchangeable game cartridges. However, the console's success was constrained by a small number of games, a small screen, and easily damaged cartridges. Nintendo also entered the handheld market with its Game & Watch series in 1980; it featured a game platform on one screen and a clock on another in a dual screen prefiguring the Nintendo DS. Despite these early entries into handheld gaming, the widespread commercial success of handheld games was yet to come in the form of the Nintendo Game Boy in 1989. However, before that success occurred, the video game industry as a whole underwent a series of major economic and technological shifts.

By the mid-1980s, the golden age of video games was at an end. The major home consoles had all been discontinued or were struggling for viability. Coin-op video games were experiencing a similar decline, with arcades closing globally. Other platforms, such as handheld and home computer–based gaming, were not yet well established enough to support an entire industry. Video games began to be seen as a fad. The stage was set for a major adjustment in the medium and the market.

In 1983, the Japanese company Nintendo successfully launched the Famicom console in Japan. Based on its success, in 1985, it released another version of the console outside of Asia, repackaging it as the Nintendo Entertainment System (NES) and bundling it with *Super Mario Bros.* (1985). The NES's instant success, due in part to the popular Mario series, drove the emergence of the third generation of home consoles (1983–95), which led to the successful reemergence of the console market that drove subsequent generations of hardware, each delivering increased graphic and computational capacity. Importantly, the succession of console generations is delineated by the computer technology that drives the hardware, commonly expressed in terms of graphic capacity, and is considered complete only when active development and publisher support for that hardware has ended, meaning that console generations do not begin and end in neat bookends but instead tend to overlap by several years.

The fourth generation of consoles (1987–99) was dominated by the Super Nintendo Entertainment System (SNES) and SEGA Genesis, and the fifth generation (1993–2006) saw competition between the Nintendo 64 and the Sony PlayStation, with lesser market attributed to the 3DO Interactive Multiplayer, Atari Jaguar, and SEGA Saturn. The dominance of the PlayStation console was solidified in the sixth generation (beginning in 1998) with the Sony PlayStation 2 (PS2), which competed with the Nintendo GameCube and later the Microsoft Xbox. The failure of the SEGA Dreamcast in this generation would push SEGA out of the console hardware market altogether.

By the seventh generation (beginning in 2004), the console market had narrowed to three main competitors: the Microsoft Xbox 360, the Sony PlayStation 3 (PS3), and the Nintendo Wii. The same advances in computer technology that had made home consoles viable similarly drove an expanding handheld and home computer market, with publishers increasingly able to release ports or tailored versions of the same games for all three markets. The eighth generation continued these trends with the release of the PlayStation 4 (PS4) and Xbox One in 2013. Nintendo sought to bolster its sagging console sales through the release of the Nintendo Switch in 2014, a tablet/console hybrid that could be connected to a television or used as a mobile device. Overall, mobile gaming devices saw significant sales impact from the spread of mobile phones capable of providing game content.

Entering the twenty-first century, the video game industry was in the midst of rapid economic, demographic, and technological growth. By 2017, U.S. retail sales of computer and video game hardware approached $7 billion, with software, in-game purchases, and subscriptions topping $29 billion (Entertainment Software Association 2018, 10). In May 2005, Microsoft initiated the seventh generation of console hardware with the official unveiling of the Xbox 360, which was shipped to initial markets in November of the same year. Sony's PS3 and Nintendo's Wii followed a year later in November 2006. Although many industry analysts and fans predicted a showdown between Sony and Microsoft in terms of hardware capacity and technological capability, it was Nintendo's sales that surged. The Wii was computationally less powerful than its direct competitors, but its success hinged on two elements: it offered motion control–based gameplay and appealed to a broader audience than the Xbox 360 and PS3, both initially targeted at a more traditional, or "core," market of males under age thirty-five. Although motion control devices had been commercially released in the past, Sony's EyeToy being one example, the Wii was particularly successful in appealing to women and older consumers, in part by offering games that were more casual and accessible. The success of Nintendo's motion control technology subsequently led its competitors to announce their own motion-based devices: the Microsoft Kinect and the Sony Move.

The merit of expanding the market demographic rather than fighting for a larger percentage of the existing market became a key consideration during the global recession of 2008. Many industry pundits predicted that the video game industry would be "recession proof," similar to the film industry during the Great Depression, the argument being that as people had less money for entertainment, they would look for better return on their dollar and be more inclined to stay home and play games. Additionally, with the increasing age and gender diversity of the gameplaying demographic, any particular demographic falloff should be offset by a larger economic pool overall. However, reality proved more complex. A more accurate depiction is that although certain areas of the game remained stable or grew significantly, other areas retreated considerably. The years 2008 and 2009 saw a series of layoffs, project cancellations, reorganizations, and closures across the industry. Some industry stalwarts struggled, most notably Midway, one of the oldest game publishers in the industry, whose financial troubles resulted in bankruptcy, partial acquisition by Warner Bros. and other parties in the summer of 2009, and eventual dissolution of the remaining branches.

However, the same technological advances that drove home computer sales and expanded the home computer game market also opened the door to new game industry markets, particularly in the form of online casual games, social games, mobile games, and massively multiplayer online role-playing games

(MMORPGs). Mirroring the success of the Wii, casual developers and publishers, such as PopCap, Big Fish, and Game House, as well as browser-based social game developers, such as Zynga and Playdom, all saw significant growth driven to a large extent by appealing to a broader demographic of game players. In a survey by the Entertainment Software Association (ESA) across all game platforms and genres, video game players were 55 percent male and 45 percent female, a 5 percent increase in female players since 2009, and the average player was thirty-four years old (Entertainment Software Association 2018, 6). However, online social gamers skewed significantly older and more female. In a study released by PopCap, researchers found that 54 percent of online social gamers in the United States were female, 58 percent in the United Kingdom were female, and the average social game player was forty-three years of age (PopCap 2010, 5–6). All three major console manufacturers appealed to a similar demographic by launching online, where consumers can purchase games and downloadable content as well as arrange online matches, purchase streaming videos and music, and access numerous other services.

Subscription-based MMORPGs were another area of reliable growth in the industry, growing by 22 percent in 2008 to a spending level of $1.4 billion in the United States and Europe (Harding-Rolls 2009, 1). Although demographic surveys of MMORPG audiences have been somewhat contradictory to date, depending on game and platform, the overall success of the genre has been remarkable, most notably shown by the success of Activision Blizzard's *World of Warcraft* (*WoW*). Only four years after its launch in November 2004, *WoW* boasted more than eleven million monthly memberships (Cavalli 2008). Although one survey suggested that *WoW* players were 84 percent men and 16 percent female, the average female player was older on average than her male counterpart, and the percentage of female players was significantly higher in older subsegments (Yee 2009), suggesting on some level that a demographic shift was present in MMORPGs as well.

The 2012 Kickstarter campaign for Oculus Rift initiated a renewed interest in virtual reality (VR) platforms. Though research into VR can be traced back to the 1960s with experiments such as Martin Hellig's Sensorama from 1962 or the first head-mounted display developed by Ivan Sutherland and Bob Sproull in 1968, the technology was costly and cumbersome; usually confined to use in technical fields, such as military, automotive, and medical applications; and developed by the U.S. military, NASA, or university-based research teams. The 1990s saw the first commercially available VR entertainment platforms released by SEGA and Virtuality, though hardware remained expensive and required extensive computer resources, ruling out a widespread home entertainment application. With the success of the Oculus Rift prototype demos, and the company's acquisition by Facebook in 2014, other competitors quickly followed suit: Valve and Sony in 2014, Google in 2015, and Apple, Amazon, Microsoft, HTC, and Samsung by 2016. While the availability of VR hardware rapidly increased, the rate of adoption and its viability as a creative platform is still in its initial stage.

The scope of the video game industry has changed radically since its origins in coin-op and home video consoles. Advances in computing devices pushed the boundaries of gameplay, and their ubiquity made games a common presence in everyday life, expanding notions of the video game industry beyond standard definitions. The diversification of the market has led to increasing specialization by publishers, studios, and individual developers. The days in which a single programmer would handle code, graphics, audio, and design are now primarily reserved for subsections of independent, experimental, and casual game developers, and it is not necessarily the case that a game developer can smoothly move from one type of game development to another. The video game industry is a major participant in the global software and entertainment industries, making games accessible on a variety of platforms, targeting them at a broad spectrum of consumers, and making them available at nearly every moment in the average consumer's life.

Trevor Elkington

Further Reading

Cavalli, Earnest. "World of Warcraft Hits 11.5 Million Users." *Wired*, December 23, 2008. Available at http://www.wired.com/gamelife/2008/12/world-of-warc-1.

Entertainment Software Association. "2018 Sales, Demographics, and Usage Data: Essential Facts about the Computer and Video Game Industry." Entertainment Software Association Archive, December 24, 2018. Available at https://www.theesa.com/esa-research/2018-essential-facts-about-the-computer-and-video-game-industry/.

Harding-Rolls, Piers. "There's Life beyond *World of Warcraft*: Online Gamers Will Spend $2Bn on MMOG Subscriptions by 2013." *Screen Digest*, 2009. Available at https://web.archive.org/web/20090714024711/http://www.screendigest.com/press/releases/pr_24_03_2009/view.html.

Kent, Steven L. *The Ultimate History of Video Games*. New York: Three Rivers Press, 2001.

Laramée, Francois Dominic, ed. *The Secrets of the Game Business*. Hingham, MA: Charles River Media, 2005.

Michael, David. *The Indie Game Development Survival Guide*. Hingham, MA: Charles River Media, 2003.

Newman, James. *Videogames*. New York: Routledge, 2004.

PopCap. "2010 Social Gaming Research." 2010. Available at https://web.archive.org/web/20110207013124/http://www.infosolutionsgroup.com/2010_PopCap_Social_Gaming_Research_Results.pdf.

Siwek, Stephen W. "Video Games in the 21st Century: Economic Contributions of the US Entertainment Software Industry." *Entertainment Software Association Archive*, 2007. Available at https://www.theesa.com/wp-content/uploads/2019/03/2017-EIR-National-Report.pdf.

Wolf, Mark J. P., ed. *The Medium of the Video Game*. Austin: University of Texas Press, 2001.

Yee, Nick. *The Daedalus Project*. Vol. 7-1, March 9, 2009. Available at http://www.nickyee.com/daedalus/gateway_intro.html.

Infocom

Infocom was a computer game publisher that brought text adventure games from giant university mainframe computers to the masses in the privacy of their own homes. Infocom dominated American software charts for half a decade and is mostly remembered for the popular *Zork* series of games.

Infocom appeared as a result of a project developed by Massachusetts Institute of Technology (MIT) students, primarily Dave Lebling and Marc Blank, both members of the Dynamic Modeling (DM) group within the Laboratory for Computer Science (LCS). Their initial endeavor never included plans for starting a business or creating a commercial product because they were motivated to improve upon the first mainframe interactive text adventure game, *Colossal Cave Adventure* (1976), also referred to as *Colossal Cave*, *Adventure*, or simply *ADVENT*.

Although *Adventure* proved to be addictive, players at LCS became frustrated with the limitations of the game. The command line interface was simple and could only process two-word inputs; many objects were introduced within the game that did not allow interactivity. Because the DM members were also computer programmers, they decided to try and improve on *Adventure*. The team consisted of Blank and Lebling as well as Tim Anderson and Bruce Daniels. When their work concluded, the game *Zork* (1979) emerged and ran on Digital Equipment's PDP-10 mainframe computer.

Zork was different from its predecessor in many ways and had a more sophisticated English parser that allowed for more complex interaction. The two-word inputs had been replaced with more natural commands, such as "Hit the ugly troll with the double-bladed axe." The parser program running *Zork* analyzed the words in a sentence and identified parts of speech, such as nouns, adjectives, verbs, and other forms of grammar, making for a more enjoyable and interactive interface.

Although *Zork* was fun, many of the members of LCS decided to work together outside of MIT, and on June 22, 1979, ten LCS members became officially incorporated as a business. The Infocom name was chosen because it was determined to be the least offensive name to everyone involved. The members of the newly formed company wanted to release business applications similar to the popular and groundbreaking VisiCalc spreadsheet software; however, they realized that the company would quickly go out of business without a product to sell and generate income to keep it afloat. As a result, *Zork* was initially revived to generate revenue. It had already been written and tested and was nearly ready for release.

In the late 1970s, mainframe computers began to migrate from universities to personal computers in private homes. Personal computers at the time were very expensive, so only wealthy professionals could afford them, a well-educated demographic that enjoyed reading, making them a perfect market for literary text games. (Later, writer Douglas Adams contacted Infocom about giving his books an interactive treatment, leading to the release of *The Hitchhiker's Guide to the Galaxy* [1984], further merging the literature and software connection.)

The initial hurdle for Infocom was how to make the megabyte-sized mainframe program *Zork* run on a home computer with only a 32 KB capacity. Some optimization was required, and the result was the Z-machine, a software application designed specifically for text adventure games. Because the game in its entirety was not needed at all times, the Z-machine was in essence an example of an early virtual memory manager. The Z-machine would only load portions of the game at one time from the floppy drive into a computer's main memory and then only access additional information when needed. With this technique, *Zork* was made much smaller. The Z-machine also implemented other techniques such as compressing text. However, *Zork* was still too large to fit on a home computer floppy disk. Infocom then decided to split the game into three parts, releasing the game with two sequels and, in essence, tripling the sales opportunities. In the end, Infocom brought text adventures into the home, first releasing them on the TRS-80 Model 1 in 1980. The Z-machine was written to be portable to other platforms. As a result, *Zork* and future Infocom text games could be easily ported to other computing platforms of the time being sold by Amstrad, Apple, Atari, Commodore, IBM, Texas Instruments, and others.

Because Infocom titles were text based, they were also sold by book retailers. With an additional market available to them that was unavailable to other software publishers, Infocom games dominated software sales charts from 1981 to 1985. Another reason why Infocom games outsold their competitors is their elaborate packaging, which made games more immersive and piracy more difficult. Many Infocom games included extra props tied to the game that could not be easily duplicated and often contained clues or information required to clear certain parts of a game. These props were referred to as *feelies*, and their origin was an accident. When Marc Blank, the designer of *Deadline* (1982), could not fit all the information needed to solve the case on the disk, the additional information was included in the game's packaging. Rather than just use a printed game manual, an entire police dossier was included that contained detailed information needed to solve the game. For instance, *Deadline*'s feelies included a police memo, murder scene photo, lab report, plastic bag with three pills, the inspector's casebook, the coroner's corpus delicti, and police interview notes.

By 1982, Infocom was a proven success and decided to launch its business division. Although this was the initial intent of the company when formed in 1979, the transition proved harmful to the company as a whole. The rapid growth required the company to move to a larger and more expensive space, and additional resources were required, such as the purchase of an expensive DECSYSTEM-20 to be used for development. More damaging was the cost of paying a workforce that tripled. The move also divided them into two distinct and different factions, the game developers and the business division. When profits from the games division were channeled to fund the business division's relational database *Cornerstone* (1985), resentment divided the company further. Infocom spent over $2.5 million developing *Cornerstone*, but when it was finally released, sales were less than half of what the company projected, netting below $2 million.

Over time, as computer graphics improved, Infocom's text-based game sales suffered. They were no longer selling more than one hundred thousand copies of each released game as before. *Cornerstone* sales were even worse, selling only ten thousand copies before Infocom shut down the business division entirely.

In June 1986, game developer and publisher Activision saved Infocom by purchasing the company for $7.5 million. To compete in a modern market, *Foolblitzky* (1986) was released and was the first Infocom title to leave the text-only format and feature graphics. *Beyond Zork* (1987) introduced a graphical user interface (GUI) to the *Zork* franchise and featured an interactive map and inventory menu. The final Infocom-released *Zork* title, *Zork Zero* (1988), debuted the following year. In 1989, when Infocom failed to reinvent itself, Activision dismantled the company.

Activision, holding all Infocom copyrights, released *The Lost Treasures of Infocom* (1991), which contained twenty Infocom titles bundled together for Amiga, Apple, and MS-DOS home computers. The instructions for all the games were bound together in a single volume. Sadly, the feelies were not reproduced for the set in their original format but reduced to photocopies or images of the actual objects for budgetary reasons. Activision later released a follow-up, *The Lost Treasures of Infocom II* (1992), reviving eleven more Infocom titles.

Although Infocom is gone, the *Zork* franchise lives on. Activision later released *Return to Zork* (1993), *Zork Nemesis* (1996), and *Zork: Grand Inquisitor* (1997). The most recent Zork title, *Legends of Zork* (2009), was not a retail release but instead a free browser-based online game.

Michael Thomasson

See also: Text Adventure Games

Further Reading

Briceno, Hector, Wesley Chao, Andrew Glenn, Stanley Hu, Ashwin Krishnamurthy, and Bruce Grannell. "The Making of Zork." *Retro Gamer* 77 (2004): 36–39.

Tsuchida, Bruce. *Down from the Top of Its Game: The Story of Infocom*. Springfield, NJ: Rolenta Press, 2010.

Williams, Wayne. "The Next Dimension." *Retro Gamer* 10 (2004): 30–41.

Interactive Movies

The interactive movie genre holds a place in the history of video games for one main reason: its well-known failure. Made possible by the increased storage capacity used by laserdisc games and CD-ROM-based games, the idea was to take the term *video game* literally by combining full-motion video (FMV) of live-action footage and cinematic techniques with a gaming experience. Interactive movies came to have a bad reputation because of the limited possibilities of their branching structures, their lack of interactivity, poor acting, and, in the case of early interactive movies, their low-resolution imagery and the dismal quality of their playback. The interactive movie was more concerned with questions of nonlinear storytelling and photo-realistic imagery than the development of innovative gameplay. Considered the cutting edge of technology in the early 1990s and the future of the industry (mainly by those who were making them), interactive movies were rarely made by the end of the decade. Yet, some interactive movies had quite an impact in their day.

Although the genre came to be associated with live-action video, its first occurrence was an animated interactive movie now displayed in the Smithsonian Institution alongside the only two other video games there, *PONG* (1972) and *Pac-Man* (1980). *Dragon's Lair* (1983) was one of the first analog laserdisc-based coin-op video games to be released. The gamer was indeed invited to play his or her "own" cartoon, embarking on a fantasy adventure as Dirk the Daring, a valiant knight rescuing the fair and voluptuous Princess Daphne from the clutches of Singe the Evil Dragon. The gamer's actual participation consisted of making decisions by using a joystick to give Dirk directions or hitting an action button to make him strike with his sword. The decision tree gameplay of *Dragon's Lair* attracted a following and remains the basic design model of interactive movies, and the game's popularity encouraged the release of similar games, such as *Space Ace* (1983) and *Badlands* (1984). In the 1990s, SEGA TruVideo Productions such as *The Masked Rider: Kamen Rider ZO* (1994) and *Mighty Morphin' Power Rangers* (1994) even recreated a similar experience using footage from the popular television series. Nevertheless, those games never achieved the same success. The company American Laser Games revived the use of live-action video in the arcade at the beginning of the 1990s with nine laserdisc games. In games such as *Mad Dog McCree* (1990), *Who Shot Johnny Rock?* (1991), *Space Pirates* (1992), and *Crime Patrol* (1993), the gamer had to first and foremost draw his or her light gun before his or her rivals did. The simple plotlines were of course a pretext to stage many shoot-outs that took place in different locations.

It is really with the advent of CD-ROM-based games that movie-like gaming experiences arose. The introduction of the Multimedia PC (MPC) in 1990 and the release of the peripheral Turbografx-CD in 1989, the Philips CD-i system in 1991, the SEGA CD add-on in 1992, and the 3DO Interactive Multiplayer console in 1993 marked the increased use of live-action video. Unlike cartridges, the CD-ROM's storage capacity allowed the storing of movie sequences that were even called *cinemas* at the time. Available only on CD-ROM, *The 7th Guest* (1993) was one of the three "killer applications" that launched the multimedia revolution, along with *Myst* (1993) and *Doom* (1993). Inspired by the board game *Clue* (1949) and by David Lynch's television series *Twin Peaks* (1990–91), *The 7th Guest* is mainly a puzzle-oriented game. By solving the brainteasers, exploring the space, and clicking on objects, the gamer of *The 7th Guest* is rewarded with sequences that uncover the secrets of the mansion. Unlike their arcade game progenitors, these games typically staged their actors in virtual settings. The huge success of *The 7th Guest* saw the release of similar games and of a sequel, *The 11th Hour* (1995). Rob Landeros teamed up with David Wheeler, the director of the film parts of *The 11th Hour*, to produce two of the last interactive movies on DVD: *Tender Loving Care* (1999) and *Point of View* (2001).

Made by Digital Pictures in 1992, *Night Trap* is one of the first live-action video games released on the SEGA CD, which became famous for the controversy it sparked. Playing an agent of the SEGA Control Attack Team, the gamer had to protect a group of five girls at a weekend house party from vampires by closely monitoring, through hidden cameras, eight rooms displayed at the bottom of the screen and capturing the hooded intruders with traps concealed in the house. Although the action was far from gory—the girls do not run naked in the house, and the goal is to save, not kill, the young ladies—*Night Trap* was, along with the fighting game *Mortal Kombat* (1992), the center of a congressional investigation regarding violence in video games. The hearings led to the development of a ratings system, at first SEGA's own Videogame Rating Council (VRC) in 1993 and then the video game industry's Entertainment Software Rating Board (ESRB) the following year. Yet, the release of *Voyeur* (1993) for the Philips CD-i did not bring as much political controversy, despite similar gameplay and content adult-oriented enough to receive an 18 certificate by the British Board of Film Classification. *Voyeur*'s gameplay consists of clicking on windows of a manor to read information, look at personal belongings, hear conversations, and witness some scenes between the characters staged in digital settings.

Interactive movies with mystery or detective stories are numerous and better described as adventure games in which the gamer works along with the investigator. *Sherlock Holmes Consulting Detective* (1991) is the first game of this kind and the earliest use of live-action video in a small window at the center of the screen. Various mysteries and detective movie games have been developed, such as *The Dame Was Loaded* (1995), *Ripper* (1996), *Black Dahlia* (1997; with a record eight CD-ROMs), and *The X-Files Game* (1998). Hyperbole Studios made two early examples of "VirtualCinema movies," *Quantum Gate* (1993) and *The Vortex: Quantum Gate II* (1994), but Access Software's *Tex Murphy* series (1989–98) is the most well known of this type. From low-resolution talking heads that answer questions in *Martian Memorandum* (1991), to the film clips that appear with character interaction or clicking on objects in *Under a Killing Moon* (1994), to the full wide-screen imagery of *Tex Murphy: Overseer* (1998), one can see the evolution of the use of live-action video.

The attraction of live-action video inspired celebrated game designers to move in this direction. Although all games with live-action video were expensive to produce, Chris Roberts's *Wing Commander III: Heart of the Tiger* (1994) was marketed as a multimillion-dollar production ($3.5 million) and had a cast led by Mark Hamill (Luke Skywalker of *Star Wars* [1977]) and Malcolm McDowell. Through conversations, the gamer has to choose between two options in regard to a character or an event; decisions made by the gamer during conversations have an impact on what will happen in the galactic combats. The series was successful right from the start in 1990, and two subsequent games were made in the same way: *Wing Commander IV: The Price of Freedom* (1995) and *Wing Commander: Prophecy* (1997).

Carrying on the Sierra On-Line tradition of point-and-click adventure, Roberta Williams and Jane Jensen created two classics of the interactive movie genre, *Phantasmagoria* (1995) and *The Beast Within: A Gabriel Knight Mystery* (1995). The third-person perspective *Phantasmagoria* takes place in a digitally rendered manor and town where Adrienne, the main character, has to discover the mystery of the manor and fight an evil spirit she ill-advisedly released and who comes to possess her husband. The game contains a rape and several violent death scenes and was controversial enough to be banned by the Australian government. Jane Jensen's *The Beast Within* alternated between Gabriel Knight and his assistant Grace Nakimura as they try to explain the mysterious existence of a werewolf. Praised as a great adventure, it was also considered to be one of the few successful examples of live-action video used over photographic backdrops.

As real-time three-dimensional graphics engines grew in image processing power during the mid-1990s and delivered a much more truly interactive experience, the production cost and the lack of malleability of the filmic image, coupled with limited gameplay, became less appealing for both designers and gamers. Yet, as for any old school gaming practice, branching interactive experiences using live-action footage are still made. *Her Story* (Sam Barlow, 2015), *The Bunker* (Splendy Games, 2016), *Late Shift* (CtrlMovie, 2017) and *The Infectious Madness of Doctor Dekker* (D'Avekki Studios, 2018) were released on various platforms. The internet-based video-on-demand service Netflix has put the spotlight on the genre by streaming the interactive episode *Black Mirror: Bandersnatch* (David Slade, 2018). The latter is actually an explicit reference to video games, as the story, set in 1984, revolves around a young programmer pursuing the dream of adapting a "choose your own adventure" book to revolutionize the adventure game genre. Nevertheless, the fact remains that such productions as well as the interactive cinema experiment in the 1980s and 1990s still demonstrate that video games are not movies.

Bernard Perron

See also: Laserdisc Games

Further Reading

Perron, Bernard. "Genre Profile: Interactive Movies." In *The Video Game Explosion: A History from PONG to PlayStation and Beyond*, edited by Mark J. P. Wolf, 127–133. Westport, CT: Greenwood Press, 2007.

Interface

The concept of *interface* refers to the point of interaction between two different systems. In the study of human-computer interaction, it refers more specifically to any component that allows users to provide input into a system or get feedback about the system's state. According to this definition, any type of feedback—visual, aural, or tactile—is part of the general interface between the user and the system; on-screen elements such as resource indicators and menus are known as the graphical user interface (GUI). Following a presentation of the basic components of physical interfaces and their most common assemblages in video game controllers and arcade cabinets, this entry will discuss how user manipulations are mapped onto virtual actions and the type of feedback provided.

MATERIAL FOUNDATIONS

Many computer interface devices have been developed to facilitate the manipulation of symbolic information in the context of work (such as a numeric keypad, keyboard, and mouse). The interfaces created more specifically for the enjoyment of video games were often inspired by control devices already found on other types of machines, such as buttons and knobs on radios and televisions, steering devices and levers used in vehicles, and guns. Before arcade video games, many coin-operated mechanical entertainment cabinets were already based on these controls. Globally, we can regroup video game manipulation interfaces in five categories: corporeal interfaces able to capture part of the body's natural expression; technomimetic interfaces materially designed to evoke a common tool or prop (such as a gun or steering wheel); generic interfaces, which are handheld interfaces that do not have clear mimetic abilities or associations and can symbolically adapt to a wide variety of scenarios; screen-augmented interfaces that rely on additional on-screen props (such as menus, icons, or verbs) to be selected by a pointing device; and verbal transcoding, which is a type of interface that involves writing commands in a syntax that can be understood by the computer.

The most basic and enduring component used in the design of video game controllers is the digital switch, which is based on a simple ON/OFF logic. When a button is pressed, it becomes active on the electric circuit and can be registered by the system. Classic arcade cabinets, such as *Battlezone* (1980) and *Star Wars* (1983), often relied on a digital optical encoder; LEDs light up or turn off depending on the user's manipulations, and a phototransistor detects these variations, which will be interpreted by the program. In 1962, a group of hackers at the Massachusetts Institute of Technology (MIT) created a dedicated control box for their game *Spacewar!* (1962). It included a button to launch torpedoes and two switches: the horizontal one controlled the rotation of the ship, and the vertical one could move the ship forward or initiate hyperspace. The configuration of switches according to a directional logic has been prevalent throughout the history of game controllers. The Atari VCS 2600 had a four-way digital joystick, whereas the Fairchild/Zircon Channel F's joystick could register eight positions. The small directional pad (D-pad) that became the norm with the SEGA Master System and the Nintendo Entertainment System (NES) has been integrated on recent controller designs by Microsoft and Sony and even on the motion-sensing Wiimote.

Early in the medium's existence, digital switches coexisted with analog controls. Analog buttons and joysticks do not obey a binary, discrete state logic; they are built on the principle of the potentiometer (progressive voltage alterations) and thus are able to input incremental variations that depend on the pressure applied by users. Many early systems were bundled with paddles dedicated to playing *PONG* (1972) or its clones; potentiometers allowed users to control the movement and speed of the paddles on the screen. Most game controllers since the Nintendo 64 have integrated multidirectional analog sticks, and the dual-stick configuration first seen in the PlayStation DualShock controller has been replicated in many contemporary interfaces. The first Xbox gamepad also integrated analog shoulder triggers. In contemporary console games, the speed of the avatar's movement or rotation of the virtual point of view is often mapped on these analog sticks.

Game designers have created interfaces that mimic specific tools or real-world apparatuses, and this tendency can again be observed at the very onset of commercial video gaming. Ralph Baer designed a light gun interface for the first home console; the Shooting Gallery sold for the Magnavox Odyssey included the light gun and four additional acetate TV overlays for the system. The arcade game *Gran Trak 10* (1974) had players use a steering wheel to control a car in a race, and many racing games since have integrated the wheel and pedals. Midway's *SeaWolf* (1976) had a periscope interface that users had to rotate to aim at enemy vessels. The cabinets of many shooting games integrated mounted guns and joysticks similar to those of actual aircraft (as in *Star Wars* [1983] and *After Burner* [1987]). Some versions of SEGA's *Hang-On* (1985) even had a toy replica of an actual motorcycle that users would move to steer. Many variations of these mimetic interfaces have been released for major home entertainment systems by the console maker itself or by third parties; Saitek, for instance, specializes in the design of authentic aircraft controls to be used with popular flight simulation software.

On top of these common components, a variety of devices have been developed to capture the motion of users more thoroughly. The Nintendo DS's touchscreen can register presses and wipes. The cameras in the EyeToy and Kinect can capture the movements of the whole body and display a moving image of the user on the screen. The infrared sensor of the Wii allows users to point anywhere on the screen, and the accelerometer integrated in the Wiimote can detect velocity variations on three axes. These motion capture devices have proved successful for sports games and minigames based on a variety of situations (e.g., *Cooking Mama* [2006] and *Wii Sports* [2006]). However, game design at large has refrained from integrating complex gestures, even if corporeal interfaces have been developed by most major console producers.

ACTION MAPPING AND FEEDBACK

Games of an abstract nature often integrate physical manipulations at face value: users are required to type words or numbers or to displace objects using directional buttons or a mouse pointer. A significant number of games propose more complex make-believe scenarios, where the actual manipulation (or primitive action) performed by the user is mapped into a virtual action depicted on the screen (Grodal and Gregersen 2008). The player's action and its in-game counterpart form a "dyad," and the accumulation of all these dyads form a repertoire of action that helps define the avatar in the game world. Many different mapping designs have emerged in the history of games, from the most isomorphic (in terms of motor activation) to the purely symbolic. Primitive and virtual actions can be symbiotically mapped thanks to the affordances of corporeal and technomimetic interfaces, but miniature gestures (or metonymic mapping) are also common in designs that emphasize "natural" interaction. Even if a design does not involve motor isomorphy, a strong connection between primitive and virtual actions can be established through a synchronic mapping. A virtual action may require the accumulation of many primitive actions to be performed (cumulative mapping), and the mapping itself can be limited to kicking off a virtual action that will be completed automatically on the screen (punctual mapping).

Since the release of the Nintendo Wii, console developers typically integrate corporeal affordances in their controllers or have developed some additional corporeal interfaces for their system. Commercial products associated with virtual reality (VR), such as the Oculus Rift and the PlayStation VR, reactivate the ideal of a perfectly natural interface. Moreover, technomimetic add-ons are a mainstay in the history of game accessories; even the Wiimote could be custom fitted with a great variety of plastic add-ons that mimic weapons or vehicular controls. Yet, in practice, symbiotic mappings remain somewhat marginal. They are first and foremost extensively integrated through technomimetic interfaces developed for the vehicular simulation genre.

The user's virtual actions are depicted in a variety of ways; the different forms of aural, visual, and tactile feedback in games have an impact on the type of mapping perceived by users. To create an impression of symbiotic or synchronic mapping, the system must provide feedback at a sufficient pace during user manipulation. The feedback in itself can be enacted through the game world or through a series of aural/visual/tactile indicators, or even verbal and numerical semiotic markers; in *Gameworld Interfaces* (2013), Kristine Jørgensen highlights various feedback strategies situated at various points in between these two poles. Typically, game designers represent player action using both strategies; game state modifications are signified through the world and by indicators overlaid on top of the world. One interesting example of such an assemblage appears in classic sports-themed video games; in *PGA Tour Golf* (1991) and *Mortal Kombat* (1993), players first interact with a visual indicator through a cumulative mapping, clicking multiple times at the right spot on the line or manically waggling the joystick to "test their might"; following this test, results are enacted in the game world. In *Just Dance* and similar series, players try to reproduce on-screen models who do not react directly to their moves captured through corporeal interfaces; various indicators and a summary score highlight the successful nature of this mimicry during or following each song.

Many video games have tried to maximize the isomorphic/symbiotic nature of their manipulation and provide only naturalistic feedback through the game world in an engaging way. Jørgensen associates this fascination with the transparency fallacy: the widespread idea that more natural/invisible interface design leads to more immersive experiences. Ultimately, the immersive power of the video game medium is largely due to the possibility to bind a simple button to any imaginary action on the screen. Furthermore, it should be noted that every technological device—even the most mimetic ones—used as an input interface in the context of a video game implies its own affordances and perceived limitations; even seemingly adaptable corporeal interfaces are more suited to very specific dimensions of human agency.

Carl Therrien

See also: Controllers; Gestural Interfaces; Immersion; Joysticks

Further Reading

Forster, Winnie. "Steering through the Microworld: A Short History and Terminology of Video Game Controllers." In *Space Time Play*, edited by Friedrich von Borries, Steffen P. Walz, and Matthias Böttger, 88–99. Basel, Germany: Birkhäuser, 2007.

Grodal, Torben, and Andreas Gregersen. "Embodiment and Interface." In *The Video Game Theory Reader 2*, edited by Bernard Perron and Mark J. P. Wolf, 65–83. New York: Routledge, 2008.

Jones, Steven E. *Codename Revolution: The Nintendo Wii Platform*. Cambridge, MA: MIT Press, 2012.

Jones, Steven E. "Controller." In *Debugging Game History. A Critical Lexicon*, edited by Henry Lowood and Raiford Guins, 81–87. Cambridge, MA: MIT Press, 2016.

Jørgensen, Kristine. *Gameworld Interfaces*. Cambridge, MA: MIT Press, 2013.

Laurel, Brenda, ed. *The Art of Human-Computer Interface Design*. Reading, PA: Addison-Wesley Professional, 1990.

Therrien, Carl. "From Video Games to Virtual Reality (and Back): Introducing HACS (Historical-Analytical Comparative System) for the Documentation of Experiential Configurations in Gaming History." DiGRA Conference July 3–6, 2017. Available at http://www.digra.org/wp-content/uploads/digital-library/57_DIGRA2017_FP_Therrien_HACS.pdf.

Therrien, Carl. "Interface." In *The Johns Hopkins Guide to Digital Media and Textuality*, edited by Lori Emerson, Marie-Laure Ryan, and Benjamin Robertson, 305–309. Baltimore, MD: Johns Hopkins University Press, 2014.

International Arcade Museum. *See* Museum of the Game

International Center for the History of Electronic Games (ICHEG)

The International Center for the History of Electronic Games (ICHEG) at the Strong National Museum of Play in Rochester, New York, collects, studies, and interprets video games and related materials to explore how electronic games are changing the way people around the world play, learn, and connect with each other.

ICHEG defines *electronic games* broadly to include video games, computer games, console-based games, arcade games, handheld games, and toys that combine digital and traditional play. By the start of 2018, ICHEG's rapidly growing collection included more than sixty thousand video games and related artifacts and hundreds of thousands of archival items. In addition to games and the platforms on which they are played, the collections include game packaging and advertising, game-related publications, game-inspired consumer products, other items that illustrate the impact of electronic games on people's lives, and personal and business papers of key figures in the electronic games industry.

ICHEG's collections are housed at the Strong National Museum of Play, alongside and linked directly with a world-class collection of hundreds of thousands of board games and role-playing games (RPGs), toys, dolls, puzzles, and other artifacts of play, countless numbers of which have inspired and informed the creation and development of electronic games. ICHEG is additionally supported by the Strong's Brian Sutton-Smith Library and Archives of Play, a research library of more than 130,000 volumes.

ICHEG's collection is both broad and deep. For example, the collection includes more than three hundred mechanical, electromechanical, pinball, and video game arcade games. These include Gottlieb's *Humpty Dumpty* (1947), the first pinball with electromechanical flippers; the first arcade video games, *Computer Space* (1971) and *PONG* (1972); and rare and unique machines, such as the prototype for *Asteroids*.

Tens of thousands of games and systems in the collection cover every generation of console gaming, from the earliest systems, such as the Magnavox Odyssey (1972) and Home PONG (1975), through the most recent systems from Nintendo, Sony, and Microsoft. The console-based games range from the mass-produced to the rare, such as a gray *NES Nintendo World Championship 1990* (1990) cartridge and an Atari 2600 *E.T.: The Extraterrestrial* (1982) cartridge excavated from the Alamogordo landfill in New Mexico. The collection is international in scope, including more than eight thousand Japanese video games.

ICHEG's collection also features a wide range of personal computer games from the 1970s to the present, including examples produced for the earliest home systems, such as the Apple II and Commodore 64, down to a wide variety of modern home computer games. Particularly notable is ICHEG's collection of more than five thousand children's educational computer games and its collection of more than one thousand games from the *Computer Gaming World* collection.

Mobile games are an important part of ICHEG's collection, including not only handheld systems with interchangeable games, such as Parker Brothers' Microvision, the Atari Lynx, the Nintendo Game Boy, the Nintendo DS lines, and Sony's PlayStation Portable, but also hundreds of dedicated handhelds of the 1970s and 1980s that companies such as Coleco and Mattel produced. These are augmented by a wide variety of electronic toys from companies such as Texas Instrument, VTech, and LeapFrog. The Strong is also involved in efforts to preserve materials related to contemporary smartphones.

ICHEG has a wide range of library and archival materials that document the history of gaming. These include an extensive game magazine, arcade flyer, and game guide collection of more than twenty thousand items. ICHEG preserves development documents, business records, and other papers from some of the industry's most important game designers, such as Ralph Baer, Will Wright, Don Daglow, Jerry Lawson, Ken and Roberta Williams, Jordan Mechner, Dan Bunten (Dani Bunten Berry), Carol Shaw, and many others. The museum's corporate collections are equally rich, documenting the game development and business activities of companies such as Atari's coin-op division, Sierra, Broderbund, Her Interactive, and Williams. The museum also engages in special collecting programs, such as its Women in Games initiative to document the history of women's contributions to the history of video games.

ICHEG engages in a wide-ranging strategy to preserve the unique digital resources in its collection. Museum staff undertake efforts to capture videos of original gameplay, image disks, repair and conserve arcade games, and collect and preserve documentary materials in its temperature- and humidity-controlled state-of-the-art facility.

Beyond collecting and preserving such materials, ICHEG develops exhibits such as eGameRevolution and Pinball Playfields on the history of video games and pinball. These exhibits are on permanent display at the Strong National

Museum of Play. ICHEG also produces an array of online interpretive content both on its own website and in partnership with Google Arts and Culture and edX. ICHEG makes its resources available to scholars, people in the games industry, and others interested in the history of video games to encourage research and writing about the historical and cultural significance of video games and other electronic games.

Through all of these activities and more, ICHEG seeks to ensure that present and future generations can explore the history of electronic games, understand how they began and evolved, appreciate who played what roles in that evolution, and grasp the impact that electronic games have had on society.

Jon-Paul C. Dyson

See also: Strong National Museum of Play

Further Reading

International Center for the History of Electronic Games (ICHEG) website. Accessed September 21, 2020. Available at http://www.icheg.org.

International Game Developers Association (IGDA)

According to its website, the International Game Developers Association (IGDA) "is the largest nonprofit membership organization serving all individuals who create games" (IGDA website 2018), with more than 150 chapters and special interest groups (SIGs). The mission of the IGDA is to connect game developers and build community among them, to advance their careers and professional development, and to advocate on issues affecting the game development community, including business and legal issues, censorship, credit standards, diversity, and student and academic relations. The IGDA also includes a code of ethics on its home page.

In early 1994, debates occurred in the U.S. Congress that resulted in the proposed Video Game Rating Act of 1994 (which was not passed) as well as the establishment of the video game industry's own Entertainment Software Rating Board (ESRB). Video game developers felt that they lacked a voice during the debates, which led the Computer Game Developers Conference (now Game Developers Conference [GDC]) to establish the Computer Game Developers Association in 1995, with Ernest W. Adams as its first president, to provide a professional organization for video game industry professionals. In 1999, the group's name was changed to the International Game Developers Association (IGDA) to reflect the international scope of the organization. Management of the IGDA was initially handled by Miller-Freeman (now CMP), the company that had bought the Computer Game Developers Conference in 1995, until 2004, when the IGDA took over the running of the day-to-day operations of the organization. It is now governed by an elected board of directors.

The IGDA currently sponsors a number of SIGs, fora, wikis, and a monthly newsletter as well as the IGDA Foundation, which supports the mission of the

IGDA and offers scholarships, game industry research, and an eJournal. The IGDA also has local chapters across the United States, Canada, South America, Europe, Asia, Australia, and India and has partnered with other organizations to sponsor events such as the annual Global Game Jam.

Mark J. P. Wolf

See also: Game Design

Further Reading

International Game Developers Association (IGDA) website. Accessed September 21, 2020. Available at http://www.igda.org.

Ireland

Ireland may not come immediately to mind as a powerhouse of games culture, technology, and art. Yet, this country, with a population the size of the city of Philadelphia, is one of the largest exporters of software in the world, is an English-speaking country within the European Union, and has significant social and economic connections to the United States. This spatialization has produced some significant game development pioneers and technologies.

In the 1970s, Atari had a factory in Tipperary, Ireland, that produced arcade cabinets for shipping around Europe. At one stage, it employed almost two hundred people and was producing two thousand cabinets a month. Arcade game cabinets that included *Asteroids* (1979), *Missile Command* (1980), *Centipede* (1981), and later *Indiana Jones and the Temple of Doom* (1985) and *Gauntlet* (1985) were shipped from Ireland around Europe. The factory itself had various owners from Warner to Namco Bandai, reflecting wider shifts in the industry, the crash in the 1980s, and the arrival of Japanese companies in the West. To some extent, this factory merely reflected larger technology policies in Ireland at the time, such as to attract into the country foreign-owned companies in microelectronics and manufacturing that were significant employers. The cultural and social aspects of gameplaying were largely ignored.

When it came to producing games, the first well-known examples were games produced under license. Emerald Software, a Waterford-based company, produced content under license for the American publisher US Gold, including *Moonwalker* (1988), a Michael Jackson–based game, for the ZX Spectrum in 1989. In a recent talk in Ireland, Damian Scattergood, one of the developers, recounted that the developers got to see the script of the associated film before it was released so they could develop the game scenarios. The toughest challenge was that the publishers were insistent that Jackson had to be represented on the tips of his toes!

The outsourcing tradition continued into the 1990s. Funcom, a Norwegian company, set up an office in Dublin to produce PlayStation One games, including *Speed Freaks* (1999). They closed their Irish office when they moved into the production of massively multiplayer online games (MMOGs), including *Anarchy*

Online (2001). As for original games, individuals such as Steve Collins produced games for the Commodore 64 in the 1980s. The best known were *Badlands* (1990) (a port of Atari Games' arcade game *Badlands* [1989]) and *Herebotix* (1984). His work, wrestling graphics onto 8-bit systems, served him well. Collins went on to become a computer graphics specialist and cofounder of the physics middleware company Havok in 1998. If you turned over any significant international console game in the 2000s, you would see the iconic Havok symbol. Irish start-up Demonware (2003) also became fundamental to the burgeoning multiplayer gaming scene during that decade and was bought by Activision Blizzard in 2007.

By the early 2000s, technology specialist companies such as Havok and Demonware were making internationally recognized middleware, and international publishers such as Vivendi and Microsoft had located their European support and localization offices in Ireland. Research calculated that there were about 350 people employed full-time in the games industry at this point, but almost two-thirds of these were in localization (Kerr 2003). Things were more challenging for game developers. There were few game development courses available, so many individuals immigrated to the United Kingdom and the United States. Significant capital was required to develop a game for the main consoles of the day, but there were few individuals or companies with the track record in Ireland to assuage the publishers to invest. The establishment of the community-based website www.gamedevelopers.ie in 2003 helped to bring together the nascent local games culture.

In 2002, a government report noted that the games industry had excellent potential for growth (Forfás 2002). New educational programs were established in many of the technical colleges and universities. Some local companies received investments, but already the shift to online and social games was changing the landscape globally. While technology companies could weather the technological shifts, smaller start-ups found it challenging. Many graduates from college had to immigrate elsewhere to work in the games industry or move into booming related technical fields at home.

Ten years later, a series of academic and government reports noted the rapidly growing if undulating numbers employed in the sector (Kerr 2012; Kerr and Cawley 2012). From a low of 300 in 2002, reports now estimated almost 2,000 people employed, of which almost 1,450 were direct (Olsberg SPI 2017). Much of this employment was in publishing, middleware, and community management for the major international publishers, including Electronic Arts (EA), Activision Blizzard, Riot, Facebook, and Zynga. However, some start-ups had spun out from the international companies, and others had moved to Ireland. Digit Games, founded by Richard Barnwell and company, drew upon a decade of expertise internationally to found an online games studio in Dublin. They were able to secure venture capital funding. Brenda and John Romero established Romero Games in the west of Ireland and are currently attracting international workers to relocate there to work on their new projects. *Gunman Taco Truck* (2017) was designed and codeveloped by their nine-year-old son and was translated into the Irish language. It is available on Steam.

For Irish game development graduates, and small- to medium-sized Irish-based game companies, key challenges remain. As in other countries, the rise of new routes to market, new development tools, and eager graduates have led to a strong growth in independent studios. Yet, a Fulbright-funded report by Brenda Romero (2015) noted that there were not enough entry-level games jobs in Ireland to accommodate Irish graduates. An Olsberg SPI (2018, 7) report noted that "Ireland's games companies struggle to find funding for the development of projects." Yet, some do succeed. Companies such as Simteractive and Gambrinous have successfully released PC games via app stores and Steam. Immersive VR Education released *Titanic VR* on Occulus Rift, HTC Vive, and Windows Mixed Reality in 2018 following a successful Kickstarter campaign. It was developed using original footage from the wreckage of the RMS *Titanic*.

Many of these companies are active in an association called Imirt, which acts to represent game makers locally. *Imirt* means "play" in Irish. This organization is contributing to a rather vibrant scene of game jams, festivals, gatherings, and events. Game developers may now apply for some limited public funds from national and European screen media production programs. Finally, we are seeing commercial consumer gameplaying events that focus on cosplay, casters, and merchandising. It remains to be seen whether these consumer-type events will be successful.

Aphra Kerr

See also: United Kingdom

Further Reading

Forfás. *A Strategy for the Digital Content Industry in Ireland*. Dublin, Ireland: Forfás, 2002.

Kerr, Aphra. "'Live Life to the Power of PS2': Locating the Gaming Industry in the New Media Environment." *Irish Communications Review* 9 (2003). Open access journal. Available at http://www.dit.ie/icr/media/diticr/documents/2%20Kerr%20ICR%20Vol%209.pdf.

Kerr, Aphra. "The UK and Irish Game Industries." In *The Video Game Industry: Formation, Present State, and Future*, edited by Timothy D. Wilson and Peter Zackariasson, 116–133. New York and London: Routledge, 2012. Available at http://eprints.maynoothuniversity.ie/6368/.

Kerr, Aphra, and Anthony Cawley. "The Spatialisation of the Digital Games Industry: Lessons from Ireland." *International Journal of Cultural Policy* (2012): 1–21. Available at https://doi.org/10.1080/10286632.2011.598515.

Olsberg SPI, with Nordicity. *Economic Analysis of the AudioVisual Sector in the Republic of Ireland*. London: Olsberg SPI, 2017. Available at http://www.imirt.ie/industryreports/.

Romero, Brenda. "Fulbright Visit Report. Ireland." Fulbright Ireland. 2015. Available at https://static1.squarespace.com/static/5553dcdfe4b0df27f2734788/t/5b360deeaa4a99232a65c8be/1530269230486/FulbrightReport_Jan19.pdf.

Italy

Video games entered Italian society in the late 1970s, mostly notably *Space Invaders* (1978), with a few other exceptions. Investing more in hardware development than software and play, Italian information technology (IT) developer Olivetti produced globally competitive computing machines without thinking of any dedicated games. On the other hand, arcade manufacturer Zaccaria developed the first Italian coin-op, *Quasar* (a *Space Invaders* clone), in 1980 (also worthy of mention is Zanussi's Creativision platform). Such attempts, however, had a marginal impact compared to the global success of American and Japanese machines. The early cultural imaginaries of games produced in Italy were initially and largely characterized by themes imported from transnational media, such as high fantasy, space, and the Cold War. Games also sparked a nascent hacker subculture, beginning with early adopters and experimentations. As a consequence, creative elements of national or regional character, which were largely absent at the beginning, began to emerge through local designers and companies by the late 1980s.

Between 1985 and 1995, the Italian video game development scene started to take shape with Idea, Simulmondo, Genias, and other small-to-medium work design, production, and distribution teams. In a market where consumption and the development of a critical scene and fandom were largely spun by the localization of foreign products, Simulmondo experimented with peculiar distribution models (e.g., games sold as episodes at newsstands and presented in glossy comic-like cases) and successfully built brand and license relationships with themes and brands from national creative industries, teenage audiences, and popular culture, especially via comics (such as *Dylan Dog* [1986–present] and *Lupo Alberto* [1974–present]), pioneering a serial and cross-media mode of production and attempting to reach European and international audiences. Sports were a significant theme as well, as in the case of *Mille Miglia* (1991) and *I Play 3DSoccer* (1991).

The early 2000s were characterized by an increasing need for large budgets. Italian software houses had to gather sufficient financial resources to claim a position in a market dominated by harsh international competition. Two companies emerged as leading examples: Milestone and Artematica. Both initially focused on the PC market and were eventually able to license original products for the international console manufacturing giants. On the one hand, Artematica can be taken as an example of how Italian productions functioned through a combination of adaptations and the licensing of local brands deemed as having enough potential to attract a national and transnational audience (such as *Druuna: Morbus Gravis* [2001], *Totò Taste* [2004], and *Diabolik: The Original Sin* [2007]). On the other hand, Milestone was the only Italian company that was able to develop the resources to produce demanding triple-A game franchises such as *MotoGP*, *Ride*, and *WRC*, usually themed after attractive sports and racing brands. The increasing need for significant production capital also widened the geographical gaps between more and less affluent regions in the Italian scene.

During the 2010s, the increasing global expansion of video game audiences as well as the potential for easier access to development and distribution tools allowed for a flourishing of small companies and independent teams alongside an expanding triple-A industry, coinciding with a diversification of audiences. Success stories include Italian game company and publisher Mangatar and games such as *Bang!: The Official Video Game* (2010) and *Candy Crush Saga* (2012), which hailed from companies either based in Italy or that involved Italian designers and lead practitioners. However, Italy largely remained a consumer base for foreign productions while also providing a localization workforce for external producers and distributors. While multinationals such as Ubisoft consolidated their presence in Italy by opening local headquarters, smaller Italian software houses (e.g., RayLight and SpinVector) struggled to keep pace with personnel and resources. In parallel, distributors such as 505 Games and Leader became publishers with a global scope (e.g., *PayDay 2* [2013] and *Rocket League* [2015]).

In principle, the rise of crowdsourcing platforms, free game engines, and accessible delivery channels and the potential for mobile/social market penetration during the 2010s also helped the national production scene to establish itself on the global stage. However, no nationally distinctive Italian wave of mobile/social video game companies and games emerged. Still, elements of innovation developed from within the indie scene. Molleindustria, a collective of game designers, created highly groundbreaking serious games (e.g., *Operation: Pedopriest* [2007] *and Faith Fighter* [2009]).

Mobile devices also increased the audience of the medium, pushing local developers to find novel solutions to attract players. Some elements of “Italianness,” such as references to pop culture, emerged in games such as *Doom and Destiny* (2011) and *Joe Dever’s Lone Wolf* (2013), even though mostly within transnationally recognizable styles (such as pan-Asian role-playing game [RPG] aesthetics and Western graphic novels). Casually oriented projects embedded themes from Italian national and popular cultures and histories while trying to attract both a domestic and international audience. The industry’s overall production presents an ambivalent character, oscillating between global themes, such as 1980s nostalgia and chapters of Italian history. Some games sought to employ the medium to convey themes of national culture (as in the case of Italian National Resistance during World War II, which is represented in the video game *Venti Mesi* [2016]).

Over the past decade, scholars and small companies have developed small-to-medium production scale games with national and regional themes (e.g., *Wheels of Aurelia* [2016], *Slaps and Beans* [2017], and *Milanoir* [2018]). These games drew on themes from Italian society and popular actors and film genres, making use of regionalisms and providing discourses on nationhood and its narratives as their main features or selling points. Such productions coexist at the national level of production in a separate niche from the local subsidiaries of multinationals such as Ubisoft. While triple-A products such as the *Assassin’s Creed* series may resort to globally recognizable, grand historical themes and commonplaces, such as Italian Renaissance, the increasing mainstreaming of games in Italian society has inspired institutional and entrepreneurial projects aimed at supporting the local industry and cultural heritage through digital games. Thus, various initiatives have begun to praise games as a medium through which to promote national and regional heritage at an international level, making the Italian market a promising terrain of investigation for the institutionalization of digital games. The establishment of AESVI, Italy’s association of game producers and distributors, has been hailed as a major turning point for the promotion of the national games market, which still struggles with poor public support, lack of private investments, and insufficiently coordinated education efforts.

Enrico Gandolfi and Marco Benoît Carbone

See also: France; Germany; Spain

Further Reading

Gandolfi, Enrico. "Italy." In *Video Games around the World*, edited by Mark J. P. Wolf, 305–318. Cambridge, MA: MIT Press, 2015.

J

Jaguar. *See* Atari Jaguar

JAMMA Standard

The *JAMMA standard* is a wiring standard for arcade video game machines that determines the specifications for the connection between the main system board and the various parts of the game cabinet, such as the power supply, the monitor, the speaker, and the control panel. It was created in 1985 by the Japan Amusement Machinery Manufacturers Association (JAMMA).

Before the introduction of the JAMMA standard, arcade games typically utilized custom circuit boards, power supplies, and wiring harnesses. Given the high cost of an arcade cabinet, it was not financially advantageous to replace the entire unit once the popularity of a given game waned. To avoid unnecessary expense, arcade operators often converted the cabinet to accommodate a newer, more popular title. However, because the components were not designed with interchangeability in mind, such conversions usually required performing some modifications to the hardware—from simple rewiring to extensive and complex alterations. Even though manufacturers followed their own internal standards, technology changed quickly, and it was not uncommon for two game boards released by the same company to be incompatible.

Under the new specifications, the custom components were replaced with interchangeable parts. JAMMA-compatible system boards feature a 56-pin (2-by-28 pins) edge connector with a standardized layout of inputs and outputs. These include inputs for +5V and +12V power lines, a coin slot mechanism, test and service switches, two start buttons (for the one-player and two-player versions of the game), and two sets of controls (one four-way joystick and three buttons per player) as well as outputs for the RGB video signal and monophonic sound.

Adopted by most manufacturers, the standard ensured that any JAMMA board would be compatible with any JAMMA cabinet. This greatly simplified the conversion process, as the replacement of the system board could now be performed on a plug-and-play basis. The specifications also limited the number of buttons to three per player, although some games utilized the unused pins to connect a fourth button. Any nonstandard inputs—for instance, for games supporting more than two players or using specialized controllers, such as analog joysticks, trackballs, or light guns—required additional connectors. An example of such a connector is the *kick harness* used in Capcom's *Street Fighter* series cabinets to attach three additional buttons per player. The name derives from the extra inputs that were used to control kick attacks in the game, but it is now used interchangeably with *extra harness* or *plus harness* to denote any auxiliary button harness. Although there is no official standard for such additional inputs, game boards that utilize them are commonly referred to as *JAMMA+*.

Approximately four hundred game boards supporting the JAMMA standard are currently known to exist that were produced between 1985 and 1997. The original JAMMA standard was eventually superseded by the newer JAMMA Video Standard (JVS). Introduced in 1996 to accommodate modern peripherals, it replaces the edge connector with an HD-15 video connector, RCA connectors for stereo sound, and a USB connector for I/O interface. The SEGA NAOMI arcade system (see SEGA Dreamcast) is an example of a JVS-compatible system.

P. Konrad Budziszewski

See also: DECO Cassette System

Further Reading

Tominack, Noel. “The Video Game Industry Learns from the Data Communications Industry.” CoinOps.org. Available at http://arcarc.xmission.com/archive/Faqs/JAMMA%20Orgins%20Paper.txt.

Japan

Along with the United States, Japan is one of the most prominent countries producing video games. Since the late 1970s, it has been an important part of the video game industry, as much from an economic standpoint as from a cultural point of view.

Even though video games were invented in the United States, Japanese amusement companies soon took part in the industry’s blossoming. Shortly after Atari (an American company despite the Japanese name) found success with *PONG* in the United States in 1972, some established companies started to import American arcade games and to create *PONG* clones and other innovative games to distribute in department stores and amusement establishments, which eventually evolved as dedicated Japanese “game centers” (*geemu sentaa* or *geesen* in Japanese). |In 1975, Taito (a business founded in 1953 by a Russian businessman that specialized in importing and distributing vending machines) exported its first arcade game, *Western Gun*, which was renamed *Gun Fight* and distributed by Midway in the United States. In 1978, Taito released one of the most popular arcade games of all time (and by far the most successful in Japan), *Space Invaders*, which began the huge contribution of Japanese creativity in the global video game industry. The company Namco (from Nakamura Manufacturing Corporation; founded in 1955) followed in 1980 with another huge success, *Pac-Man*.

In the beginning of the 1980s, many Japanese arcades and video game companies became extremely successful, such as SEGA (a merger of Rosen Enterprises and Service Games, both founded by Americans but established in

Japan after the World War II to import amusement machines), Konami (founded in 1969 as a jukebox rental and repair business that had its first arcade success in 1981 with *Frogger*, developed by Konami but distributed by SEGA/Gremlin), Jaleco (founded in 1974 as Japan Leisure Corporation), Capcom (Japan Capsule Computers; founded in 1979), and especially Nintendo (founded in 1889 as a card game company; it released *Donkey Kong* in 1981, introducing the iconic character Jumpman, who soon became known as Mario, spawning the *Mario* series of games).

Game!
Medal Arcade Video
MEDAL GAME
ARCADE GAME
VIDEO GAME
GAME!
アドアーズ
300
サービス!

The storefront of the Adores Milan Arcade in the Shinjuku ward of Tokyo, Japan. (SeanPavonePhoto/Shutterstock.com)

Nintendo, and its subsidiary Nintendo of America (founded in 1979 to distribute its games in the United States), helped to revitalize the American video game industry after the crash of 1983 with its hugely successful home game console. Released in July 15, 1983, as the Famicom (Family Computer) in Japan and then renamed the Nintendo Entertainment System (NES) for its release in North America in 1985, it went international in October 1986. Since the mid-1980s, Japanese console manufacturers have dominated the hardware market (in console-based games and handheld games), which have been marked by famous competitive economic battles and aggressive marketing campaigns (Nintendo versus SEGA in the late 1980s and the beginning of the 1990s; Nintendo and SEGA versus Sony since the mid-1990s, with the release of the Sony PlayStation in 1994 in Japan and 1995 in the United States and Europe; and after the 2001 demise of SEGA, competition continued with the release of the Sony PlayStation 2, PlayStation 3, and PlayStation 4 and the Nintendo Wii, Wii U, and Switch).

In software, Japan has also dominated the market for a few decades with creative and original games and series that have deeply imprinted the gaming culture of the 1980s and 1990s. Series such as Nintendo's *Mario* (started in 1981), *The Legend of Zelda* (started in 1986), and *Metroid* (started in 1986); SEGA's *Sonic the Hedgehog* (started in 1991); Konami's *Castlevenia* (started in 1986) and *Metal Gear* (started in 1987), and Capcom's *Mega Man* (started in 1987) and *Street Fighter* (started in 1987), just to name a few, as well as genres such as role-playing games (RPGs; often labeled as JRPGs—"J" for "Japanese" or console-based RPGs), the two most famous series being Square Enix's *Final Fantasy* (started in 1987) and *Dragon Quest* (started in 1986), fighting games (with series such as Capcom's *Street Fighter*, SEGA's *Virtua Fighter* [1993–2014], Namco's *Tekken* [1994–2018] and *Soulcalibur* [1996–2018], and series by the arcade company SNK, which has specialized in the genre), shooting games (mostly the "shoot 'em up," or "shmup," subgenre that has been very popular in Japanese arcades), survival horror games (such as Capcom's *Resident Evil* series [1996–2019], Konami's *Silent Hill* series [1999–2012], and Tecmo's *Fatal Frame* series [2001–15]), and other genres popular in Japan, such as visual and sound novels, *eroge* (erotic games), and dating sims, have all helped to consider a singular style for Japanese games as well as a deeply involved following (in Japan and abroad).

Among these very popular games, and often their even more popular characters (Mario, Sonic, Pikachu, etc.), which have served as cultural icons for Japan and the countries importing them, the creators (including Shigeru Miyamoto, Yuji Naka, Yu Suzuki, Hideo Kojima, Tetsuya Mizuguchi, Shinji Mikami, Fumito Ueda, Suda 51, SWERY, Hidetaka Miyazaki, and Yoko Taro) have sometimes become as famous as their games or characters and are often recognized as auteurs in Japan (and abroad), similar to the way certain directors are recognized in cinema (such is also the case for certain game music composers, such as Koichi Sugiyama (*Dragon Quest*) and Nobuo Uematsu (the majority of the *Final Fantasy* games), as game soundtracks are a major industry in Japan and have their own dedicated section in music stores).

Video games from Japan are generally characterized by specific aesthetic features. They are often associated with a propensity for audiovisual details and unbridled creativity. Consequently, they have often been received outside Japan as curious (even inaccessible) demonstrations of oddness and craziness or, conversely, as interesting and exotic curiosities. The peculiarity of Japanese video games manifests itself in the large variety of themes, influenced as much from Japanese traditional and contemporary popular cultures as from popular American and European cultures, as well as complex narratives, echoing those found in manga (Japanese comic books) and anime (Japanese animation). Above all, these two very popular media have defined the caricatured or comic book representational style that is recognizable in many Japanese games. The *media mix* between anime, manga, and video games goes well beyond their hybridized aesthetic features and has helped to create a solid contents market in Japan and abroad.

The appeal of video games in Japan has led to a devoted gaming culture, as much in arcades (game centers) as in the home, with a strong level of fandom in each. This involving interest has been closely tied with the ones for manga and anime and thus have taken some part in the encompassing *otaku* culture that has reached North American, European, and other Asian countries.

The Japanese video game industry has been in line with the rapid expansion of other industrial businesses in Japan (cars, electronics, etc.) since the earliest post–World War II times, and Japanese industries have consequently divided international markets into three main zones (Japan, United States, and Europe; even though the Asian market is always on the radar, it is more complicated to penetrate and remain in), the same divisions the global video game industry has consistently adhered to (up to now, as globalization has also resulted in a proliferation of local markets and clusters).

In the beginning of the 2000s, the American software giant Microsoft entered the hardware market, and as the global video game industry became efficiently transnational, the Japanese video game industry has been less successful in dominating the global market (even though many Japanese companies have only focused on the local market). Some even claimed there was a crisis in the Japanese video game industry (indicated by a continuous decline in software and hardware sales in Japan for the arcade and console markets) that was caused by many factors, such as a backlog in video game development technologies and studios' management (compared with the United States and Europe), a stubborn focus on once cost-effective series and clones, and difficulties in rapidly adapting to the evolving market, especially in online development and services. The emergence of new markets, such as mobile games, currently the fastest-growing and most profitable game business in Japan, has also forced the industry to adapt to new business strategies. As a highly unpredictable industry, it is difficult to know what the future holds for the video game industry in Japan; however, it will surely remain a significant contributor to the video game field.

Martin Picard

Further Reading

Aoyama, Yuko, and Hiro Izushi. "Hardware Gimmick or Cultural Innovation? Technological, Cultural, and Social Foundations of the Japanese Video Game Industry." *Research Policy* 32, no. 3 (2003): 423–444.

Aoyama, Yuko, and Hiro Izushi. "Industry Evolution and Cross-Sectoral Skill Transfers: A Comparative Analysis of the Video Game Industry in Japan, the United States, and the United Kingdom." *Environment and Planning A* 38, no. 10 (2006): 1843–1861.

Consalvo, Mia. "Console Video Games and Global Corporations: Creating a Hybrid Culture." *New Media & Society* 8, no. 1 (2006): 117–137.

Kohler, Chris. *Power-Up: How Japanese Video Games Gave the World an Extra Life*. Indianapolis, IN: Brady Games, 2004.

Jensen, Jane (1963–)

Jane Jensen is a game designer and writer. Her work bridges game design and development and fiction writing, and she is particularly notable for her work in the adventure game and hidden object genres. Jensen's games and novels often draw from elements of mystery, horror, and romance.

Jensen studied computer science in college, graduating with a BA from Anderson University and finding work at Hewlett-Packard. Jensen credits her initial interest in game design to when she bought her first PC and a host of Sierra games at the mall in 1989. After playing *King's Quest IV* (1988), she was hooked and eventually sought work in the games industry. As serendipity would have it, she began her career in video games as a writer for Sierra Online. There, she worked on several series, including the *King's Quest* and *Police Quest* franchises.

Jensen's first solo game design project, Sierra On-Line's *Gabriel Knight: Sins of the Fathers* (1993), was a commercial and critical success; it was also named Adventure Game of the Year by *Computerworld*. The *Gabriel Knight* series follows the adventures of the title character, Gabriel Knight, a New Orleans writer and bookstore owner who is also a Schattenjäger. As a Schattenjäger, or "Shadow Hunter," Knight investigates paranormal events with his assistant, Grace Nakimura. Jensen also served as lead designer for the Gabriel Knight sequel, *The Beast Within: A Gabriel Knight Mystery* (1995), which *Computerworld* named Game of the Year. Jensen authored two novels as part of the series before the release of the final game, *Gabriel Knight 3: Blood of the Sacred, Blood of the Damned* (1999).

Jensen's career includes work in both games and fiction. Her first stand-alone novel, *Millennium Rising* (also published as *Judgment Day*), was published by Del Rey in 1999, and her book *Dante's Equation* (2003) was nominated for the Philip K. Dick Award and received a Special Citation.

In 2003, Jensen cofounded Oberon Media, a casual games company for which she worked on a number of titles, particularly in the hidden object genre. Jensen's casual games are considered exceptional for their complex plots and sophisticated narrative worlds. For example, *Deadtime Stories* (2009) is based on the real-life case of New Orleans serial killer Delphine LaLaurie, and *Dying for Daylight* (2011) is set in the world of Charlaine Harris's Sookie Stackhouse novels, the inspiration for HBO's highly successful *True Blood* series (2008–14). During this period, Jensen also designed Wizardbox's *Gray Matter* (2010), a point-and-click adventure set in Oxford and London.

In 2012, Jensen and her husband, Robert Holmes, announced the creation of Pinkerton Road, a game company that would be built on a model similar to community-supported agriculture. Funded through a Kickstarter campaign, the company released two games: *Moebius: Empire Rising* (2014) and an anniversary edition of *Gabriel Knight: Sins of the Fathers* (2014). Since 2013, Jensen has also published over thirty gay romance novels under the pen name Eli Easton.

Jennifer deWinter and Carly A. Kocurek

Further Reading

Roberta Sabbath. "Jane Jensen's *Gabriel Knight: Sins of the Fathers*/The Numinous Woman and the Millennial Woman." *Journal of Popular Culture* 31, no. 1 (Summer 1997): 131–147.

Salter, Anastasia. *Jane Jensen: Gabriel Knight, Adventure Games, Hidden Objects*. New York: Bloomsbury, 2017.

Jordan

Maysalward, the first mobile game developer in the Middle East, was founded by Nour Khrais in 2003. Its *Backgammon* (2004) game was the first mobile game to feature local content. However, the lack of a unified platform or an app store to facilitate distribution and payment for mobile users was a major obstacle for mobile game developers. Surprisingly, Maysalward survived by making deals with regional telecom companies to localize and develop casual games in bundles.

In 2003, the game *Jenin: Road of Heroes* was published by Turath (a Jordanian e-book and software publisher), but it did not sell well (four thousand to eight thousand units), even though it copied the same political concepts as the Israeli-Palestinian conflict. The next game from the same developer was *Wild Races* (2008), a funny animal racing game that featured bareback riding on eight animals at six different tracks. It was published by Andalussoft but did not sell well either, and both the developer and the publisher stopped venturing any further into hardcore video games. The Jordanian company Quirkat is set to become a main player in the Middle Eastern video game industry and has invested in the localization and refurbishment of well-known international video games. Its first product was *Arabian Lords* (2006), a city-building strategy game from BreakAway Games and published by RED Entertainment Distribution.

Ultimately, it seemed that the home video game industry was not generating enough money. Quirkat's next ventures were in new mobile portals and casual games, including *Al-Moosiqar* (2009), a casual online game that lets players play oriental music on an *oud* (an instrument similar to the European lute), and *Tariq's Treasure* (2008), a puzzle/strategy mobile game published by BreakAway. Quirakat also developed an advergame for HTC Middle East to promote the release of a new handset model. The game, along with the strong HTC brand, attracted thousands of online players, according to the official website.

Maktoob, a successful Jordanian company, built its popularity as local provider of e-mail service that was acquired by Yahoo! Maktoob then started its own gaming platform to publish free browser-based games for the Middle East, including *Khan Wars* (2009). Alongside localized browser-based games, such as *Damoria* (2009) and *Stardoll* (2009), however, the diversity of these games and the lack of original content led to the closing of its game business in 2014.

In 2011, a group of Jordanian game studios and nongovernmental organizations (NGOs) formed the Jordan Game Task Force and successfully attracted both government and market support to create a game development environment in Jordan. Through sharing resources, investment, and training, a notable initiative was begun and was extensively supported by funds from the King Abdullah II Fund for Development (KAFD).

In 2013, Tamatem was found to localize and publish casual mobile games. Its game *Shake the Metal* (2015) was the first attempt to develop local content by introducing desert car drift. Tamatem secured five million downloads and an investment of $2.5 million.

Radwan (RAD) Kasmiya

See also: Middle East

Further Reading

Jordan Gaming Task Force website. Accessed September 21, 2020. Available at http://www.gamingtaskforce.com/.

Rahal, Maya. "Tamatem Raises $ 2.5M to Localize Mobile Games for the MENA Market." Wamda, February 2, 2018. Available at https://www.wamda.com/2018/02/tamatem-raises-25m-localize-mobile-games-mena-market.

Journalism

Formerly a niche area of coverage, video game journalism has come to include a diverse range of sources (including specialist print publications, television programs, websites, mainstream media outlets, and more grassroots online sources, such as weblogs) that provide game previews, reviews, and news about the video game industry more generally. The recent expansion of video game journalism has been largely attributed to the immense growth and profitability of the game industry since the late 1990s, which has moved the video games themselves out of a niche category and made them a medium deemed increasingly worthy of the scope of journalistic coverage given to literature, film, and television.

Sweeping technological changes in media production and distribution have also played a key role in expanding the breadth and significance of video game journalism, particularly through the popularization of the internet as a fast, inexpensive, and accessible means of both distributing and accessing journalistic content. This growth of journalistic coverage has not been without problems, however. The legitimacy of video game journalism has been challenged on the grounds that video game publishers—the most frequent advertisers in games-focused enthusiast publications—exert too much control over editorial practice. Furthermore, repeated criticisms of poor-quality reporting and writing have been leveled at those games writers and reporters who lack formal journalistic training, coming to their vocation instead through backgrounds as gamers and fans. This has led to recent attempts to establish style guides and codes of conduct designed to standardize and further legitimate video game journalism as both form and practice.

The prominence of video game journalism has always been strongly tied to the economic success and prominence of the games industry itself. The earliest journalistic coverage of video games coincided with the emergence and popularization of arcade games in the early to mid-1970s. However, this coverage was initially primarily limited to trade magazines, such as *RePlay* and *Play Meter*, which covered the coin-operated entertainment industry more generally, including everything from pinball to slot machines. As the golden age of the arcade game continued into the late 1970s and early 1980s, the first publications dedicated solely to video game coverage appeared, but in the form of trade publications addressed this time to arcade owners. With the release of incredibly successful arcade games such as *Space Invaders* (1978) and *Pac-Man* (1980), however, video games began to receive a certain degree of coverage as a cultural phenomenon in mainstream media outlets, including *GQ* and *Time* magazine.

After a false start in the early 1970s (followed by the first home console market crash in 1977), the home gaming market experienced a strong resurgence in the late 1970s and early 1980s, and with it appeared several consumer-oriented games-focused publications, including *Electronic Games*, *Joystick*, *Video Games*, and *Computer Gaming World*.

However, most of these early specialist (or as they tend to be called within the industry, "enthusiast") publications would fold in conjunction with the major video game industry crash of 1983, which was brought about in part by a glut of console systems and poor-quality games hitting the market at the same time (many console manufacturers either filed for bankruptcy or left the games industry during the crash). It would take Nintendo's resurrection of console gaming in the late 1980s and early 1990s, in conjunction with the growing popularity of PC gaming at the time, to bring a certain degree of stability to special-interest coverage of video games.

Between 1988 and 1994, a second wave of successful video game–focused magazines—many of which still exist—were launched, including *GamePro*, *Game Informer*, *Electronic Gaming Monthly*, the United Kingdom–based *Edge Magazine*, and *Nintendo Power*, the onetime in-house magazine for Nintendo now independently owned by Future Media. Although the format and editorial content varies somewhat from one enthusiast publication to the next, most of these magazines include sneak previews of upcoming game releases, features that go behind the scenes during the development of a soon-to-be released major title, strategy guides, and critical reviews of new releases. Some titles (e.g., *Nintendo Power*, *PlayStation: The Official Magazine*, *Official XBOX Magazine*) specialize in the coverage of one type of console and its game titles, whereas others, such as *PC Gamer*, strictly focus on PC gaming. At present, however, the majority of publications cover the industry across the spectrum of the console, PC, and handheld market. In 2002, G4TV, the first North American specialty television channel dedicated solely to video game–related programming was launched; however, by 2005, the channel had redefined its mandate so that its games coverage became just one facet of a broader focus on male-oriented general interest programming.

The scope and nature of video game journalism has continued to expand alongside the video game industry, which has more than quadrupled its earnings since the early 1990s, and it has grown from a niche market targeting (usually male) children and teens to one that addresses an aging and increasingly diverse demographic of players. This has especially been the case since the late 1990s and early 2000s, when hardware developers Sony and Microsoft introduced game consoles that combined increasingly photo-realistic game graphics with broader functionality as all-in-one entertainment systems that could also access the internet and play music and DVDs.

As video games steadily become a more mainstream entertainment form, journalistic coverage of games also continues to cross over into the mainstream media. This has been far from a seamless process, however, because much of the initial general interest media coverage of games focused on the moral concern surrounding the potentially negative effects of realistic violent games on children, especially in the wake of the 1999 Columbine shootings and the revelation that its perpetrators were huge fans of the first-person shooter PC game *DOOM* (1993).

This negative media attention toward video games continued throughout the multiple debates about game ratings and censorship surrounding the *Grand Theft Auto* series and continues to crop up periodically in relation to new and especially violent titles or those games (particularly massively multiplayer online role-playing games [MMORPGs] such as *World of Warcraft* [2004]) deemed so immersive that they are faulted for stealing players away from their real lives.

However, this type of negative coverage is now far outweighed by the general interest media coverage of games as a medium in their own right—and indeed, because of the unique status of video games as an industrial art, this coverage often traverses the arts and entertainment, business, and technology segments of any given media outlet. Although regular game reviews are not nearly so common as those long dedicated to newly released films and books, high-profile publications, including the *New York Times*, *Newsweek*, the *London Telegraph*, the *San Jose Mercury News*, and the *Los Angeles Times*, now have reporters and regular features solely dedicated to the coverage of video games. Due in large part to the increasing stylistic and narrative convergence of cinema and video games, even the Hollywood trade magazine *Variety* now features a section ("The Cut Scene") devoted to coverage of the video game industry. Significantly, our contemporary moment also features the first generation of journalists to have grown up with video games reaching increasingly senior positions in the industry, which has been another factor pinpointed in the expanding nature of games coverage.

The rise of the internet as a means of both distributing and accessing media content has had a dramatic impact on video game journalism in recent years. Dedicated gamers and hardcore fans who would have once needed either to get a job with the enthusiast press or create and circulate their own fanzines to get their voices heard can now easily create websites and blogs that can attract a mass readership in their own right. Although many such sites are derided by journalists and readers alike for poor-quality writing and biased opinions—often attributed to the lack of formal journalistic training of their creators—the internet has also enabled the development of some of the most unique and highly respected voices within video game journalism.

At the same time, the speed at which websites may respond to industry rumors, release advance screenshots and previews of upcoming games, and postgame reviews gives online sources certain distinct advantages over print publications such as magazines, which are hindered by long lead times before their stories are published. The demise of several long-running enthusiast magazines—including *Games for Windows* and *Electronic Gaming Monthly*—has been at least in part attributed to the speed, ease, and cost-effectiveness of accessing video game news and reviews online. At the very least, print publications have recognized the necessity of developing websites to complement, expand on, and speed up their print coverage. Some of the most popular games enthusiast publications exist solely in online format, as is the case with *IGN* (owned by Fox) and *GameSpot* (owned by CNet). Meanwhile, many of the most popular "independent" blogs and websites have been acquired by major media companies seeking to expand and diversify their holdings while their most talented writers are being seconded to positions within the mainstream press.

In 2007, in an act that both recognized the significance of online media sources and at the same time sought to bring these sources to a higher journalistic standard, the International Games Journalists Association published the *Videogame Style Guide and Reference Manual*—a resource designed to provide a common, agreed-on style and language usage that would unify all games media. However, as the two-word version of the term *video game* in the title of the *Encyclopedia of Video Games* suggests, agreeing on such common terms and usage can be a contentious matter at best. As Bernard Perron and Mark J. P. Wolf (2008) have suggested, despite the guide's best intentions to resolve disputes around terminology, some of its conclusions inevitably lead to further disagreement; for example, by somewhat arbitrarily choosing the one-word version of *videogame*, the authors go against their own criteria for common usage and accuracy because, as a survey of multiple internet search engines reveals, *video game* is by far the more frequently used term.

Despite its growing ubiquity, video game journalism has repeatedly faced criticism and scrutiny over a perceived lack of editorial integrity. In 2002, *Los Angeles Times* reporter Alex Pham wrote a scathing account of the extensive promotional freebies and exotic trips lavished on journalists by video game publishers, prompting a larger discussion of whether such giveaways earned coverage of games that would not otherwise be noteworthy and biased critics toward giving favorable reviews. (While the majority of games journalists insist that these perks do not infringe on their objectivity, most major media outlets now insist on covering their employees' travel expenses for press junkets.) Perhaps most problematically for the current and future credibility of video game journalism, there have been ongoing accusations that game publishers possess clear influence over editorial content because they remain the primary source of advertising revenue within the video game enthusiast press as well as the only source of advance production information, screenshots, and gameplay footage, and they review copies of the games themselves.

Blatant examples of this influence are difficult to substantiate because most publications possess an editorial policy that explicitly states the clear separation of editorial and advertising interests. However, the extent to which such policies are actually enforced became a topic of public debate in the wake of the highly publicized firing of *GameSpot*'s editorial director, Jeff Gerstmann. Gerstmann wrote and published a negative review of the Eidos game *Kane & Lynch* (2007) after multiple advertisements for the game had been in heavy rotation on the site in the weeks leading up to its release. Although *GameSpot*'s corporate owners at CNet staunchly denied that the firing was related to the review, games journalists and industry watchers alike have cited the incident as a revealing window into the uneasy balance that must be struck between video game publisher's interests and journalistic integrity (Croal 2007).

Jessica Aldred

See also: Atari; Careers; Merchandising; Violence

Further Reading

Croal, N'Gai. "Now Who's Being Naive, Kay? Or, Reflections on the Fundamental Contempt in Which the Enthusiast Press Is Held by Publishers—And Its Own Employers." *Level Up* (Croal's *Newsweek* weblog), December 5, 2007. Available at https://web.archive.org/web/20071213214137/http://blog.newsweek.com/blogs/levelup/archive/2007/12/05/reflections-on-videogame-publisher-and-employer-contempt-towards-the-enthusiast-press.aspx.

Ferguson, Christopher. “How Game Jouralism Lost Its Soul.” *Aero Magazine*, December 5, 2018. Available at https://areomagazine.com/2018/12/05/how-games-journalism-lost-its-soul/.

Hall, Justin. “Ethics in Video Game Journalism.” *USC Anneberg Online Journalism Review*, April 10, 2003. Available at http://www.ojr.org/ojr/ethics/1049994303.php.

Kent, Steve. “Word Play: The Evolution of Game Journalism.” Crispy Gamer, June 23, 2008. Available at https://web.archive.org/web/20120204124935/http://www.crispygamer.com/features/2008-06-23/word-play-the-evolution-of-game-journalism.aspx.

O’Neill, Sean, and Phillip Levin. “State of the Industry: Video Game Journalism.” Kombo.com, March 14, 2008.

Parkin, Simon. “Meet the Editors: The State of Game Journalism.” GameSetWatch, August 8, 2008. Available at http://www.gamesetwatch.com/2008/08/in_depth_meet_the_editors_the.php.

Perron, Bernard, and Mark J. P. Wolf. “Introduction.” In *The Video Game Theory Reader 2*, edited by Bernard Perron and Mark J. P. Wolf, 1–21. New York: Routledge, 2008.

Pham, Alex. “Gamers’ Perks, or ‘Playola’?” *Los Angeles Times*, April 8, 2002. Available at http://articles.latimes.com/2002/apr/08/news/mn-36775.

Thomas, David, Kyle Orland, and Scott Steinberg. *The Videogame Style Guide and Reference Manual.* n.p. :Lulu.com, 2007. Available at http://www.gamestyleguide.com.

Joysticks

A joystick is a game controller for two-dimensional input, for instance, for positioning and moving an avatar in a two-dimensional plane or for controlling a vehicle in two-dimensional or three-dimensional space. It developed from existing one-dimensional control devices. Its roots are found in military applications; early interactive computers in the United States needed an input device for aerial surveillance programs. Through the SAGE project in the late 1940s, the existing control stick for vehicles was modified to become a computer input device, modeled on the German *Steuerknüppel* of 1942 for controlling guided missiles (the Ruhrstahl *Fritz-X* and Henschel *Hs 293 A*). The term *joystick* (or *joy stick* or *joy-stick*) originally referred to an aircraft’s central lever, or *cloche*, at least since 1910, when it occurs in the diary of British aviator Robert Loraine. By the early 1920s, it was so common that it was routinely used, for instance, in U.S. patent applications to describe helicopter (Pescara 1925) and airplane controls (Mirick 1926). Since at least 1955, the term has been used in U.S. patent applications in connection with positioning devices (Peterson 1955).

An example of a two-button joystick. (Andrew Parfenov/Dreamstime.com)

While military use of the joystick continues, civil applications besides vessel control include the control of industrial machines and devices (especially automation systems for continuous path control and tracking control), cranes, freight elevators, electric wheelchairs, and airplanes (fly-by-wire systems). Medical uses include the operation of surgical instruments. Joystick-style wobble switches (or wobble plates) are used for device activation and other purposes by disabled users or those with poor motor control. Remote controls (e.g., TV) and some keypad-based (low-end) mobile phones use navigational pads that function like joysticks. Early instances in toys are seen in the mid-1960s in remote-controlled (RC) airplanes, such as the Kwik Fly produced by Phill Kraft, and in model vehicles. RC cars are usually controlled by two-channel RC sets (speed and steering), whereas airplanes use two (rudder and elevators), three (adding pitch adjustment), four (adding ailerons), or more channels.

The joystick's transition from toys to computers occurred at the beginning of the 1970s, when the Alto computer (developed at Xerox PARC) was designed to handle keyboard, mouse, tablet, and joystick input. Multiple applications were targeted, encompassing not only office tasks but also games, music, and children's play. Although the Alto targeted a niche market, it may be considered the start of the civilian use of the joystick as a common computer interface device. However, the Star, PARC's next commercial computer model, only had a keyboard and mouse.

The general public most likely first learned to use the joystick through playing arcade games, which proliferated on a massive scale following the unprecedented success of Atari's *PONG* (1972). Although *PONG* only used paddle controllers, other arcade games had elaborate controls tailored to the needs of each game, such as an array of specifically arranged buttons (Atari's *Asteroids* [1979]) or one or two joysticks per player (Atari's *Space Race* [1973] and *Tank!* [1974] as well as Cinematronics' *Space Wars* [1977]). Other interface devices used by arcade machines in the 1970s included life-size electromagnetic force feedback rifles, flight yokes, steering wheels, foot pedals, and trackballs.

A plethora of dedicated systems quickly descended on the home video game market. The best known of these are the (analog) Magnavox Odyssey (1972), which Ralph Baer and colleagues had developed since 1967 (Edwards 2007), Atari's *Home PONG* (1975), Coleco's Telstar Arcade (1976), and the Fairchild Channel F (1976), which featured two built-in or hardwired controllers with a number of buttons and knobs. Atari released its famous Atari VCS 2600 in 1977, complete with two paddle controllers and two CX10 (later CX40) joysticks. The joysticks used PCB-mounted membrane switches (not micro switches), had only a single fire button, and connected to the console by simple 9-pin D-Sub connectors that set the standard for home computers.

The joystick became the classic input device for games of the popular 8-bit home computers of the mid to late 1980s, including the Commodore 64, the Amstrad (Schneider in Germany) CPC, the Sinclair ZX Spectrum, and others. The improved 16-bit computers (such as Commodore's Amiga and Atari's ST) made additional use of the mouse as a primary input device. The most famous joystick of this era (and probably of all time) is the iconic Competition Pro 5000 by Kempston, although there were countless brands and models available, each appealing to different players' preferences. The first Competition Pro version, for instance, had a soft feel because it used leaf switches to detect the movement of the stick, whereas the later and more expensive version featured micro switches with a more solid and sturdy feel. This version was also more precise and durable but needed a bit more effort to maneuver. Other notable joysticks at the end of the 1980s include the Konix Speedking, Powerplay Cruiser, Quickjoy Turbo, Spectravideo Quickshot, Suncom Slik Stik, and TAC as well as the Wico Boss, Command Control and Redball. Some of these models, such as the Competition Pro and the Cruiser, and also the late 1970s Atari 2600 joystick CX40 are again available as reissues today (from the original or from third-party manufacturers).

The trend of console-based games to use joypads (or gamepads) instead of joysticks arguably started with Atari's 5200 console (1982), which had four controller ports (instead of the usual two used by the competition) and offered a unique controller with an analog stick, numeric keypad, two fire buttons (one on each side), and three other buttons (start, pause, and reset). The Emerson Arcadia 2001 had very similar controllers, and the ColecoVision (both 1982) featured a 5200-style controller but with customizable buttons. Coleco's Gemini (1982) was a 2600 clone that had two controllers, both with an eight-way joystick and a 270-degree paddle controller. Mattel's Intellivision II (1982) also had a similar controller design. Already in 1985, Nintendo's famous Nintendo Entertainment System (NES), first released as Famicom in Japan, introduced controllers that looked like modern joypads (with one digital pad on the left, two fire buttons, and two other buttons on the right side). Similar controllers were found on the Atari 2600 Junior and Atari 7800, both released in 1986, and the SEGA Master System (SMS), released in Japan in 1985 and in North America in 1986. The 1989 release of the NEC PC-Engine/Turbo Grafx-16 and the SEGA Mega Drive (Genesis in the United States) completed the development of the joypad.

The joysticks for the 8-bit computers were all digital, not analog, and they featured a four-way stick and a fire button. Despite these limitations, many additional technical features could be included, the most useful of which was autofire, which allowed the player to fire rapidly and continuously by holding the fire button instead of having to repeatedly push and release it. Some joysticks possessed an extra button with a fixed (often very fast) autofire rate (as found on the transparent-blue Competition Pro Star), whereas this feature could be switched on and off on other joysticks (e.g., the 1987 version of the Speedking). On others, it was even possible to set the rate via a potentiometer, from very slow to nearly continuous firing (as on Elite's Multi-Function 2002). Whether this feature was worthwhile depended on the action of a game. Some games, such as *R-Type* (arcade version, 1987; 8-bit and 16-bit ports, 1988 and 1989, respectively), had different functions mapped to a short button press (a shot) and a longer one (the charging the cannon for an especially powerful shot). In some games, the player character could not move as long as the fire button was pressed, as in *Gauntlet* (arcade version, 1985; 8-bit and 16-bit ports, 1986 and 1987, respectively). Some games featured software autofire if appropriate for the game, such as *Silkworm* (arcade version, 1988; 8-bit and 16-bit ports, 1988 and 1989, respectively), so as to not give an advantage to those players with autofire joysticks.

Some Competition Pro models featured a slow-motion function (on the right extra button), which pulsed the directional input and was essentially only invoked by accident and to the disadvantage of the player. Many joysticks were ambidextrous because they were symmetrically built (e.g., the Cruiser). Most computer gamers of the 8-bit and 16-bit era were accustomed to handling the stick with the right hand and triggering the button with the left thumb; however, joypad players typically controlled directional input with the left thumb and trigger buttons with the right.

When the shift in popularity from 16-bit home computers to IBM PCs (or clones) occurred (around 1990), analog joysticks were primarily available, the best of which were, arguably, made by Gravis. These connected to the computer via the 15-pin game port and were mainly used for flight and driving simulators. Many other computer games (jump-and-run games, strategy games, thinking and puzzle games) were played with the keyboard or the mouse. First-person shooters are still played this way today. The joystick became a specialized controller for the genre of flight simulation games; many high-end models closely mimic real-life controllers, for instance, in terms of form factor, materials, degrees of freedom, and force feedback (e.g., the Logitech/Saitek Pro Flight and Thrustmaster T.Flight product lines; Logitech aquired Saitek in 2016, and identical joysticks models appear to be sold under both names).

The joystick made a comeback as a general-purpose interaction device in 1992 when Ted Selker introduced the TrackPoint to IBM's Thinkpad laptop series, which was an isometric joystick that reacted to pressure rather than displacement; this technology is only used in specialized applications. The increasingly popular touchpad (or track pad) was initially more expensive but soon became available at moderate prices on the mass market and is pervasively used today.

During the 1990s, further technical advances in home consoles included faster CPUs, better graphics and sound, different storage media, and internet access. Joypads gained improved precision and durability, began to feature analog directional pads, and became wireless. Some consoles even included motion detection. After SEGA's unsuccessful SEGA Master System II (SMS II, 1990), SNK's Neo•Geo (1990) was released, which had a high-quality arcade-style joystick and arcade-level graphics. Nintendo's Super Nintendo Entertainment System (SNES; released as the Super Famicom in Japan [1991]) was the first system to feature shoulder buttons on its joypad controllers, and other systems, such as the Sony PlayStation (PS; released in the United States in 1995) followed suit. The Nintendo 64 (N64; 1996) included joypads with vibration feedback and analog sticks. In 2003, Sony's EyeToy, a camera interface for the PS2, did away with joypads and other controlling devices, opting to rely instead on movement detection as an interface technology. This was followed up with the Sony Move motion controller (2010) for the PS3, PS4 (2013), and PS VR (2016). A similar approach was taken by Nintendo with the Nintendo Wii (2006) and by Microsoft with the Kinect (2010) for the Xbox 360 and the Xbox One (2013).

From the 1980s onward, the joystick has been the ubiquitous input device for arcade games and home computer games, whereas home consoles have primarily used joypads. Today, joysticks for computers exist alongside a multitude of other input devices, and joysticks often feature eight or more often customizable buttons, a proportional four-directional stick, a throttle slider, and a digital four-way hat switch (or POV switch, a small four-way stick on top of the main stick). Some feature force feedback, and some are wireless. Joypads appear to have become more popular than joysticks, as they have similar features and are smaller, lightweight, cheaper, and possibly quicker to operate. Some controllers are themed or skinned for specific (shooting, fighting, sports) games. Other commercial game controllers include steering wheels, guns, mats, pads and boards, pseudo musical instruments, and fitness controllers. A host of high-quality controllers exist for flight simulations, including joysticks, yokes, throttle sticks, and rudder pedals.

Over the years, the joystick has undergone a tumultuous development; from its original military context and applications in toys, it went on to become a staple in arcade and home entertainment and finally a retrogaming icon. Along the way, its precision, durability, reliability, and ergonomics have improved substantially. Although technically simple, its applications have varied substantially, including vehicle control, military applications, military training, toys, industrial and medical applications, computer interfaces, mobile and communication devices, and game controllers. More recently, the joystick has lost its role as the preeminent computer game controller to the joypad, but because of the retrogaming movement, it has remained in use. The joystick has been produced in a variety of shapes, with different button configurations, analog and digital sticks, mini sticks, hat switches, navigational pads, dials, sliders, throttles, lights, displays, and other elements. Later developments include force feedback, wireless connectivity, adjustable sensitivity, button customization, and game-specific visuals. Many of these have been seen as overkill by some gamers who remember the golden age of gaming, when simple joysticks such as the Competition Pro were the dominant game controllers for the home computer.

Daniel Cermak-Sassenrath

See also: Controllers

Further Reading

Edwards, Benj. *Video Games Turn Forty*. 1UP.com, May 15, 2007. Available at https://web.archive.org/web/20200216094313/http://www.vintagecomputing.com/index.php/archives/1107/video-games-turn-forty.

The 8-bit Joystick Gallery website Available at https://web.archive.org/web/20080318080206/www.pelikonepeijoonit.net/articles/joystickz.html.

Mirick, Carlos B. *Electrical Distant-Control System*. [granted] August 24, 1926 [filed September 1, 1923]. US patent #1,597,416.

Pescara, Marques R. P. *Joy Stick*. [granted] August 25, 1925 [filed April 4, 1922]. US patent #1,550,739.

Peterson, Robert H. *Mechanical Movement*. May 31, 1955. Patent #2,939,332.

Syntax Error's Joystick and Controlpad Archive. Accessed September 21, 2020. Available at www.syntaxerror.nu/joysticks.html.

K

Killer List of Videogames (KLOV)

The Killer List of Videogames (KLOV) is the video game division of the International Arcade Museum at the Museum of the Game. A key offering of the KLOV is an online coin-operated video game encyclopedia devoted to cataloging arcade games past and present. KLOV also refers to the name of an informal grouping of dedicated arcade enthusiasts (often self-identifying as "KLOVers") who participate in online message forums and in real-world social gatherings focused around these machines.

The KLOV started out in the 1980s as informal and simple lists of coin-operated video games. These lists were distributed via online bulletin board systems (BBSs), commercial services such as CompuServe, and via Usenet.

The name "Coin-Ops A Poppin'—Killer List of Videogames" was added in 1991, as the use of the word *killer* as an adjective and an adverb was becoming a hip way of saying *excellent, complete, very cool,* or *extremely satisfying.* The first KLOV list was maintained by Mike Hughey, who soon turned over management to Jeff Hansen. Also in 1991, a separate list entitled "The definitive arcade video game cheat sheet" was being maintained by Jeremy Radlow.

Jonathan Deitch took over both lists in 1992, combined them, and worked to expand them. Under his watch, the KLOV evolved from a simple list to one managed on a structured database. Each record could be up to three hundred characters long. The encyclopedia added its one thousandth entry in March 1993.

The first KLOV website arrived in 1994 as Brian Johnson took over the role of "KLOV Keeper" and presented it on his personal home page. It is through his countless hours of work that the KLOV evolved from a list to an encyclopedia and that KLOV has become a significant brand.

Greg McLemore, the founder of numerous internet ventures, including Toys.com and Pets.com, took over the KLOV in the middle of the dot-com boom in 2000. An avid gaming enthusiast, he wanted the KLOV to enjoy the benefits of his experiences and resources for its further advancement. He registered the domain name KLOV.com. The site was rewritten in PHP, and data was stored in an SQL database. Message forums were added, and a Palm Pilot KLOV application was released. As this encyclopedia grew to include coin-operated amusement machines other than video games, the International Arcade Museum was formed, and the KLOV became a division of the larger museum in 2002.

The KLOV's online encyclopedia has extensive entries for approximately five thousand coin-operated video game machines made from 1971 through the present. The encyclopedia has cabinet, control panel, and marquee images; screenshots; video links; and census data. Entries provide machine technical information, game descriptions, cabinet information, cheats, tricks and bugs, and discussions of conversions and gameplay, trivia, and technical fix information. Legacy information (such as sequels or similar games a given game inspired) is also included.

Entries in the encyclopedia are heavily weighted for classic arcade games, that is, games released during the first twenty years of the industry (1971–91). Most games have an entry, although entries for the early games tend to be more all-encompassing. The KLOV website also includes a video game "Machine of the Moment" and a "Top 100 Videogames" list.

The site hosts message boards where collectors and fans can ask questions and get answers from experts. They can also buy and sell arcade games and parts. Today, well over one hundred thousand video game enthusiasts generate millions of page views each month, reading and contributing to the KLOV's encyclopedia and the millions of messages on its forums.

Friendships and affiliations made online follow members off-line. KLOVers meet up one-on-one, in small groups, and hundreds at a time at shows and exhibitions, such as California Extreme. These relationships enrich the participants and lead to an ever-expanding knowledge resource.

Greg McLemore

See also: Museum of the Game; Vintage Arcade Preservation Society

Further Reading

The Museum of the Game website. Accessed October 22, 2020. Available at http://www.arcade-museum.com.

King of Fighters, The Series

Made by SNK Corporation as its big-ticket entry into the then burgeoning genre of 2-D fighting games, 1994's *The King of Fighters '94* (*KoF*) was the first in what would become a long and durable series of games. In the twenty plus years since that first title, there have been fourteen entries in the main series and numerous other related side games and crossover appearances. *KoF* is one of the oldest and most established brands in the world of fighting games, and though its popularity in the United States has not been as great as in its home market in Japan, the games are still going strong, with the next installment of the series, *The King of Fighters XV*, expected in 2020.

The series takes its name from an earlier fighting title by SNK for its Neo Geo arcade hardware, *Fatal Fury* (1991). In that game, the "King of Fighters tournament" refers to a fighting tournament with a global reach, with invited competitors coming to the fictional American city of Southtown to battle for supremacy and the winner's spot. While the tournament in the *Fatal Fury* titles is a series of one-on-one battles, the standard for the genre at the time, *KoF '94* innovated by giving players a team of three fighters to use.

Appropriately, the characters in the *KoF* games are drawn from a number of other SNK titles as well as original characters specific to the series. SNK's other 1990s 2-D fighting games, such as the aforementioned *Fatal Fury* and the *Art of Fighting* games, are the source of ten of the twenty-five characters in the final roster. Four more are reinterpretations of the protagonists of other SNK games outside the fighting genre, the *Ikari Warriors* (1986) and *Psycho Soldier* (1986) action/shooter games. Over the years, SNK would continue to bring in characters from its other series and to create new characters and storylines.

In the games, players form a team of three from the roster to take into battle. Initially, players were limited to premade teams, such as the American Sports Team in *KoF '94*; over time, this was changed to allow players to create "edit teams" that included any three fighters they wished. The story and cutscene content in the games, however, is typically geared toward the standard existing three-person teams.

As was common to the genre at the time *KoF '94* was released, the gameplay in the series strongly resembles one of the most archetypal fighting game titles, Capcom's *Street Fighter II: The World Warrior* (SF2; 1991). Characters fight on a 2-D plane, are able to move backward and forward, and can jump and crouch. Instead of using *SF2'*s six-button setup, *KoF* used Neo Geo's four-button setup, giving the fighters four basic attacks: light punch/kick and heavy punch/kick. By combining the punch/kick buttons with controller movements, each fighter could perform special moves, such as throwing a fireball, making a leaping kick across the screen, or other powerful but specialized techniques. Despite their core similarities, however, *KoF* did have a few distinctive technical touches, the earliest and biggest one being an evasive dodge or roll maneuver that could be used to escape from an opponent's attacks.

Players exchanged blows back and forth, attempting to reduce their opponents' stamina to zero and knock them out; the first player to KO the entire opposing team won. The handling of the multiperson teams varied from title to title; in most *KoF* games, players chose an order for their team before the fight. In earlier titles, players could not swap characters on the fly; they fought in order as they were knocked out. Some later entries of the series, starting with *The King of Fighters 2003* (2003), allowed the player to change the character being played, provided they had not been knocked out.

If there is a hallmark to the *KoF* games that sets them apart from the *Street Fighter* games during the early period of the genre, it is the series' tendency to innovate, change, and mix up the formula. Before internet-capable home consoles were the norm, "balance changes" in fighting games—tweaks to the system and characters intended to make competition more fair between players—could not be applied by an online-delivery patch. The *Street Fighter* games addressed this by making infrequent "update" releases of their titles, such as *Street Fighter II Turbo: Hyper Fighting* (1992).

KoF, on the other hand, routinely mixed up the roster of characters, the fighting system itself, and other elements during the 1994–2003 period of yearly updates and releases. *The King of Fighters 1999* (1999) introduced the concept of a *striker*, a fourth character who could not be used to fight with directly but instead was called in to deliver a brief attack, similar to the "assists" found in Capcom's *Marvel v. Capcom* series. In *KoF 2001* players could choose the composition of their team to have as few as one fighter and three strikers, but in *2002*, the striker system disappeared altogether, paving the way for *KoF 2003* to allow players to swap characters at will midfight. That system continued in *KoF 11*, and by the time of *KoF12*, it was gone again.

The roster of playable characters would also both grow and change over the years at a rapid pace. A character might be available one game and completely removed from the roster the next, depending on the story and the decisions of the designers. Perhaps more important, their movesets or special moves were equally malleable: a special move found in one game could either vanish completely, or function entirely differently, by the next game in which that character was playable.

This dynamism and devotion to change/reinvention made *KoF* stand out in comparison to the rather more slow-to-change *Street Fighter* titles; however, some players found the lack of stability to be disorienting as well.

As of 2019, in the fighting game community landscape, *The King of Fighters* still takes a partial backseat to other more popular titles, but it still has a dedicated fan base that SNK continues to support with new releases and content.

Todd Harper

See also: Fighting Games

Further Reading

The King of Fighters Official Web Site (English version). Accessed September 21, 2020. Available at http://kofaniv.snk-corp.co.jp/english/about/index.php.

Kirby Series

Named after attorney John J. Kirby Jr., who helped win a lawsuit in Nintendo's favor (*Universal City Studios, Inc. v. Nintendo Co. Ltd*), Nintendo's Kirby began his career as a placeholder sprite at HAL Laboratory Inc. (Gach 2017). The simple round character grew on the design team, and they programmed game mechanics inspired by his appearance. His pink, ball-shaped body prompted creators to try incorporating bouncing, inflation, and floating like a balloon. Kirby could also inhale to swallow enemies or spit them back out as a projectile, although he could not fly while holding an enemy in his mouth. The flying mechanics appealed to creators Masahiro Sakurai and Satoru Iwata because it made the side-scrolling platformer-style game easier for new players. Kirby first appeared in *Kirby's Dream Land* (1992) for the Nintendo Game Boy.

Kirby's most iconic power, however, is his ability to absorb the powers of those he swallows. This ability would not emerge until *Kirby's Adventure* (1993) for the Nintendo Entertainment System (NES). The team at HAL had experience with NES development, and the greater computing power of the console allowed the team to expand Kirby's mechanics. The copy ability provided new challenges and replay value. The game received positive reviews, cementing Kirby's place as a key character in the Nintendo pantheon of recognizable mascots alongside Mario and Donkey Kong.

The majority of Kirby games revolve around platform action, in which Kirby moves from left to right, jumps on platforms, and defeats villains. Players must collect a variety of treasures, both to reach 100 percent completion and to unlock another ending, in some games. These collectibles required a fair amount of replay, as few could be acquired without first copying certain enemy powers. This added replayability encouraged players to spend time exploring every corner of the levels in search of hidden treasure.

Kirby has myriad spin-off games, many also inspired by his spherical form. For instance, *Kirby's Dream Course* (1994) is an isometric golf game with obstacles themed around recurring enemies and hazards from previous Kirby games. *Kirby's Block Ball* (1995) adds Kirby power-ups and copy abilities to the mechanics of *Breakout* (1976). He has also appeared in a few pinball games, including *Kirby's Pinball Land* (1993) and *Kirby Tilt 'n' Tumble* (2000). Other games play with Kirby's unusual materiality; in *Kirby: Canvas Curse* (2005), he is made out of clay, while *Kirby's Epic Yarn* (2010) tells a story about a woven Kirby in a fuzzy fiber world.

Kirby represents a video game protagonist reduced to its bare essentials. Beginning life as little more than an emoji, many of his characteristics, powers, and abilities were inspired by his simple design. Initially, he resisted any name thrown at him or even a simple color scheme. He is a proto emoji, taking on the role demanded of him, even if he must steal from other enemies. But, despite his generic characteristics, his franchise still holds strong, with his most recent game, *Kirby Star Allies* (2018), selling 222,000 copies within the first three days of release (Lamoreux 2018). There is something about this gumball that sticks in the public's imagination.

Colin Wheeler

See also: *Universal City Studios, Inc. v. Nintendo Co. Ltd.*

Further Reading

Gach, Ethan. "The Accidental Origins of Kirby." Kotaku, April 30, 2017. Available at http://kotaku.com/the-accidental-origins-of-kirby-1794773483.

Lamoreux, Ben. "Kirby Star Allies Is Crushing Franchise Sales Records." Gamnesia, April 25, 2018. Available at http://www.gamnesia.com/news/kirby-star-allies-is-crushing-franchise-sales-records.

Kirschenbaum v. Electronic Arts

Kirschenbaum v. Electronic Arts was the first of several landmark suits brought by video game workers challenging the industry's exploitative labor conditions and practices and demanding fair compensation from the video game industry. Along with the high-profile "ea_spouse" blog posts published several months after the suit was filed, *Kirschenbaum v. Electronic Arts* exposed the precarity and oppressive working conditions that had steadily become standard practice throughout the video game industry. At the time of the suit's filing in 2004, initiating plaintiff Jamie Kirschenbaum worked on Electronic Arts' *The Sims 2* (2004) as an exempt salaried employee in the image production department. Kirschenbaum and others in the suit alleged extreme labor conditions without fair compensation for many of the exempt graphic artists, who were regularly required to work sixty-five hours per week over the course of six or seven days. Additionally, Kirschenbaum described how the practice of "crunch time"—an ostensible emergency period of video game development when labor hours are increased far beyond normal working hours—was no longer reserved for the end of development to complete the game on time but had begun to creep throughout the entire production process and become normalized, whether there was an approaching deadline or not. Conditions for employees were only made worse by Electronic Arts' and the video game industry's standards for compensation. Electronic Arts, like many other publishers, offered employees stock options and bonuses based on performance in lieu of overtime pay, which created a system of variable, insecure income and uncompensated labor.

In response to inequity and insecurity in the production process, Kirschenbaum filed a class action lawsuit in July 2004 in an attempt to force Electronic Arts to provide back pay for employee overtime labor. The main argument of the suit was not just that Electronic Arts had inadvertently undercompensated workers but that the publisher had intentionally and improperly classified workers like Kirschenbaum as exempt to avoid paying overtime wages to these employees. More specifically, the suit argued that the employees in question were not in management roles nor were they producers of original creative work—either of which would have qualified them as exempt—and should have been properly compensated for all hourly labor.

In 2005, Kirschenbaum and the other plaintiffs settled the suit with Electronic Arts out-of-court, with Electronic Arts agreeing to pay $15.6 million in compensation and fees across the class, with the majority of the sum paid to named plaintiffs Jamie Kirschenbaum, Mark West, Eric Kearns, and Gianni Aliotti. As part of the settlement agreement, Electronic Arts also eliminated the unfair labor practices that prompted the suit and discontinued offering stock and bonuses while also agreeing to pay overtime to its employees. Although *Kirschenbaum v. Electronic Arts* was ultimately settled and dismissed, the result and consequent labor changes instituted by Electronic Arts set a precedent for future labor disputes and opened the door for further changes in the video game industry.

Caren Pagel

See also: Electronic Arts

Further Reading

Dyer-Witheford, Nick, and Greig de Peuter. *Games of Empire: Global Capitalism and Video Games*. Minneapolis: University of Minnesota Press, 2009.

Feldman, Curt. "Publisher Will Shell Out $15.6 Million to Clear the Docket of *Kirschenbaum v. EA*, as Judge Expected to OK Settlement Shortly." GameSpot, October 5, 2005. Available at https://www.gamespot.com/articles/ea-settleslabor-dispute-lawsuit/1100-6135106/.

Nichols, Randy. *The Video Game Business*. New York: Palgrave MacMillan, 2014.

Stross, Randall. “When a Video Game Stops Being Fun.” *New York Times*, November 21, 2004. Available at https://www.nytimes.com/2004/11/21/business/yourmoney/when-a-video-game-stops-being-fun.html.

KLOV. *See* Killer List of Videogames

Kojima, Hideo (1963–)

Hideo Kojima is a game designer, the founder of Kojima Productions, and the director of the *Metal Gear* series. He is a pioneer in the integration of cinematic techniques into video games.

Hideo Kojima at the *Tokyo Game Show* in 2011. (Chun Kit Ho/Dreamstime.com)

Kojima was born in Setakaya-ku Tokyo, Japan, on August 24, 1963. During his elementary school years, he was fascinated with detective novels like those based on the TV series *Columbo* and, later, various novel genres, such as mystery, adventure, and science fiction. He eventually started writing stories on his own, and he was interested in filmmaking, influenced by his father. When he went to middle school, he shot his own short films with his friends. During his high school days, he dreamed of going to an art school to be an illustrator or screenwriter after graduation. However, he put that ambition aside because of the financial circumstances of his family and chose economics as his major in college.

In his junior year, Kojima became absorbed in arcade games and especially Konami's games, such as *Yie Ar Kung-Fu* (1985). After graduation, he joined Konami at its office in Kobe, Japan, where he was originally assigned to the MSX game team. His real desire, however, was to make games for the Nintendo Famicom (the Nintendo Entertainment System [NES]), which had fewer technological limitations to development compared with MSX games. He struggled to come up with novel game ideas that would enable him to overcome the limitations of the MSX development environment, and his first such game was *Metal Gear* (1987). He was next asked to design a wargame; however, it was impossible to make an extravagant action game with multiple characters and bullets on-screen because of the MSX's limited performance. To solve this, he chose an espionage format in which a limited number of objects were shown, focusing on storyline and gameplay mechanics. *Metal Gear* was very successful in the MSX market.

In 1988, Kojima's first adventure game, *Snatcher*, was released. *Snatcher* was also the first game in which he used cinematic techniques, such as using cutscenes and narrations that would come to characterize Kojima-styled games. After that, in 1990, *Metal Gear 2* was released, and it was Konami's last MSX game.

Policenauts (1994) was Kojima's second adventure title. It was made for multiple platforms and used more sophisticated cinematic techniques than *Snatcher*, such as intro cinematic and various scene transition techniques. In 1995, he was designated as the director of Konami Computer Entertainment Japan (KCEJ) and moved to Tokyo. Three years later, he launched his first Sony PlayStation game, *Metal Gear Solid* (1998), using the full performance capabilities of the Sony PlayStation. The game was so successful that he was able to expand the *Metal Gear* franchise to the U.S. market, where *Metal Gear Solid* was even more successful than it had been in Japan, selling 6.6 million copies. In 2001, he launched the robot action game *Zone of the Enders (ZOE)* and *Metal Gear Solid 2*, which sold even more than its predecessor. On December 23, 2001, Kojima was selected as one of the top ten people by *Newsweek*, and in 2004, he launched *Metal Gear Solid 3*.

In 2005, Kojima started his own studio, Kojima Production, a software company controlled by Konami, and three years later, his first Sony PlayStation 3 game, *Metal Gear Solid 4* (2008), was released. In 2010, he launched *Metal Gear Solid: Peace Walker* for the Sony PlayStation Portable (PSP). In 2015, Kojima Productions became independent from Konami, and Kojima began developing *Death Stranding* for the Sony PlayStation 4.

Taiyoung Ryu

See also: Japan; Konami

Further Reading

Chen, Adrian. “Hideo Kojima’s Strange, Unforgettable Video-Game Worlds.” *New York Times Magazine*, March 3, 2020. Available at https://www.nytimes.com/2020/03/03/magazine/hideo-kojima-death-stranding-video-game.html.

Dawkins, Daniel. “Interview: Death Stranding: Hideo Kojima on Making the Year’s Most Divisive Game.” *The Guardian*, November 16, 2019. Available at https://www.theguardian.com/games/2019/nov/16/death-stranding-hideo-kojima-the-years-most-divisive-game.

Konami

Founded in 1969 as a company that rented and repaired jukeboxes, Konami Holdings Corporation is an entertainment conglomerate that operates casinos and health clubs, distributes trading cards and film and television programs, and develops and publishes video games. It is for video games that Konami is best known outside of Japan, both for its arcade games as well as its home video games.

Most of Konami’s earliest arcade video games—*Block Yard* (1977), *Block Invader* (1978), *Destroyer* (1978), *Super Destroyer* (1978), *Breaker* (1978), *Car Chase* (1979), *Space King* (1979), *Space King 2* (1979), *Rich Man* (1979), *Space Ship* (1979), *Maze* (1980), *Sidewinder* (1980), and *Barian* (1981)—were merely clones of other games and released by Leijac, with others released by Stern, SEGA, and Taito. The company’s first games of note were *Frogger* (1981), which was released by SEGA and featured a jumping frog that the player maneuvered through lanes of oncoming traffic, and *Scramble* (1981), a side-scrolling shooting game that was released by Stern in North America. These were followed by *Pooyan* (1982), *Tutankham* (1982), and *Gyruss* (1984).

Konami continued to develop arcade games after the video game industry crash of 1983, including some sequels and games using licensed properties, such as *Teenage Mutant Ninja Turtles* (1989), *The Simpsons* (1991), *X-Men* (1992), *G. I. Joe* (1992), and *Asterix* (1992). The company finally found its niche toward the end of the 1990s when it produced *Beatmania* (1997) and *Dance Dance Revolution* (1998); the former was a rhythm game that used five keys and a “scratchable” turntable, while the latter was a dancing game with a dance floor that players activated with their feet. Both games found great popularity, and each spawned a long-running games series; the year 1999 alone would see the release of seven more *Beatmania* games and nine more *Dance Dance Revolution* games. That same year also saw the start of a series of games based on *Dancing Stage*, a European version of *Dance Dance Revolution*, with six games produced; *DrumMania* (1999), a rhythm game with a series of drumheads that the player hit in sequence; and *GuitarFreaks* (1999), which featured a simulated guitar as a game controller. The two games could also be linked together for an even greater musical experience. *DrumMania* and *GuitarFreaks* also each spawned an ongoing game series, and in 1999, Konami changed the name of its music and rhythm division to Bemani, which was a contraction of *Beatmania* (see Bemani).

Konami also found success in home console and computer games, first making games for the Atari VCS 2600, the MSX home computer, and the Nintendo Entertainment System (NES). On these systems, and on later ones, including the Super Nintendo Entertainment System (SNES), the SEGA Saturn, and the Sony PlayStation, Konami began establishing intellectual properties and franchises, including the *Gradius*, *Castlevania*, *Metal Gear Solid*, and *Silent Hill* series of games. The company also acquired other companies, including People Co., Ltd, and Daiei Olympic Sports Club Inc. in 2000; mobile phone content developer Megacyber Corporation in 2006; Abilit Corporation in 2010; and video game company Hudson Soft in 2012.

By 2019, when the company celebrated its fiftieth birthday, Konami was selling its games for mobile devices, using them as a venue for their existing game franchises. The twenty-first century saw a new focus on esports along with the appearance and growth of the *Pro Evolution Soccer* (*PES*) series of games, with one coming out almost every year since the first was released in 2001. Another sports series, the *J-League Winning Eleven* series, has been released exclusively in Japan.

Konami also continues ventures beyond video games, including the feature film *Silent Hill* (2006) and the very successful *Yu-Gi-Oh!* Trading Card Game, which as of 2011 had sold over 25.2 billion cards. With several established franchises, an investment in the expanding esports market, and a variety of entertainment properties, Konami appears to be well positioned to continue its growth into the twenty-first century.

Mark J. P. Wolf

See also: Bemani

Further Reading

Batchelor, James. “Mobile, PES and eSports: The Three Pillars of Konami: We Speak to European President Masami Saso about How the Publisher’s Console Legacy Is Driving Its Push into Mobile and eSports.” GamesIndustryBiz.com, September 2, 2019. Available at https://www.gamesindustry.biz/articles/2019-09-02-mobile-pes-and-esports-the-three-pillars-of-konami.

Korea. *See* South Korea

L

Language

Some of the earliest research exploring individual and group-based use of computer-mediated communication and language was via text-based games such as multiuser domains (MUDs) and MOOs (MUD, object oriented) that featured cooperation, competition, and fantasy-themed settings. Researchers were often responding to popular early pronouncements that identity could be unmoored from the body online and that we were all free to be whomever and whatever we wanted via the internet. In contrast, they pointed to very gendered as well as heteronormative uses of text-based language that appeared in spaces such as fantasy-themed MUDs and experiments such as the Turing test. Likewise, players would use language in specific ways to mark—or make invisible—particular constructions of race, often leading to stereotypical representations as well as the inscription of whiteness as a norm for online spaces. More specific to games, researchers have explored several facets of language, including differences between voice and text-based language use, how talk contributes to the complexities of gameplay, and the challenges of decoding language that is specific to particular domains.

In relation to game-related talk, researchers have found that players are incredibly varied in how they use language in games, attending not only to the specifics of a game situation but also engaging in social exchange, in critiques of the gamespace and its rules, and in speculation about the larger culture surrounding games. Such components not only occur outside of the gaming situation but even within very fast-paced, competitive games that require singular attention. Facility with such language is often essential to successful gameplay and to the creation of expertise that is recognized by other players.

Of course, as higher reaction speeds are required in certain types of games, players also tend to favor voice-based communication over typed text because it is quicker and easier to use. However, researchers have found that although the use of voice has such utilitarian benefits, it can also exacerbate differences between varied types of players, strengthening some ties but weakening others, because it can highlight differences as well as be used to create racist, homophobic, and sexist atmospheres that not all players welcome.

Other studies of language and games have investigated the rich vocabularies required of players of multiplayer online games in particular to become part of a game's community. Researchers have asked what kinds or levels of "fluency" in such lingo is required for players to feel they are competent at playing a game and also at feeling part of the community at large. Likewise, researchers have begun investigating how such language use indicates informal scientific reasoning at work, as players postulate hypotheses for desired actions, work through various alternatives, test their beliefs, and then communicate the results. Overall, language is a key element of gameplay, yet one that is not yet well studied or understood.

Mia Consalvo

Further Reading

Berman, Joshua, and Amy Bruckman. “The Turing Game: Exploring Identity in an Online Environment.” *Convergence: The Journal of Research into New Media Technologies* 7, no. 3 (2001): 83–102.

Consalvo, Mia. “Lag, Lingo & Language: Theorizing Noise in Online Games.” In *The Video Game Theory Reader 2*, edited by Bernard Perron and Mark J. P. Wolf, 295–312. New York: Routledge, 2008.

Kendall, Lori. *Hanging Out in the Virtual Pub: Masculinities and Relationships Online*. Berkeley: University of California Press, 2002.

Steinkuehler, Constance. “A Discourse Analysis of MMOG Talk.” Paper presented at the *Other Players* conference, Center for Computer Games Research, IT University of Copenhagen, Denmark, December 6–8, 2004.

Williams, Dmitri, Scott Caplan, and Li Xiong. “Can You Hear Me Now? The Impact of Voice in an Online Gaming Community.” *Human Communication Research* 33, no. 4 (2007): 427–449.

Wright, Talmadge, Paul Breidenbach, and Eric Boria. “Creative Player Actions in FPS Online Video Games: Playing *Counter-Strike.*” *Game Studies* 2, no. 2 (2002). Available at http://www.gamestudies.org/0202/wright.

Laserdisc Games

The era of laserdisc games was short, lasting from 1981 to the mid-1990s. The laserdisc, an optical storage disc technology, was first commercially available in 1978 and was mainly used for movies. Laserdiscs had several advantages over videotape, including better horizontal resolution, sharper images, and instant access capabilities. The technology was adapted to arcade games, and laserdisc games included the first appearance of full-motion video (FMV) in video games.

In 1981, David H. Ahl, founder of *Creative Computing* magazine, programmed an Apple II computer to control a laserdisc and play scenes from the movie *Rollercoaster* (1975), demonstrating how the technology could be used in games. Electro Sport’s *Quarter Horse* (1981) was the first game to use a laserdisc; it had two screens, one for computer graphics and one for video. Players placed bets and interacted on the computer graphics screen and then the game randomly selected a winning horse and played a laserdisc video clip on the video monitor. Such usage was not very interactive, but others were conceiving ways laserdiscs could be incorporated into games.

Laserdisc games typically fell into two categories. The first used laserdisc imagery as a background and placed computer-generated graphics over it; in such cases, the background was a prerecorded sequence to which players coordinated their movements—for example, racing games in which players steered vehicles to avoid crashing. The game's video clip was the same every time, and players tried to fly or drive as far as they could without crashing and ending the game. One such game, *Astron Belt* (1982), was manufactured by SEGA and licensed to Bally/Midway. In this game, the player steered a spaceship through space, over land, and through tunnels and other locations seen in the video backgrounds while shooting at enemy ships and avoiding computer-generated mines. Other games with overlaid graphics that came out in 1983 included Bally/Midway's space shooting game *Galaxy Ranger*, Funai's space shooting game *Interstellar Laser Fantasy* (also known as *Interstellar*), Mylstar's flying game *M.A.C.H. 3*, and Williams's *Star Rider*. The laserdisc imagery used in these games was typically live-action video or prerendered computer animation.

The other kind of laserdisc game used the technology's random-access capability to create branching narratives that were steered by the player's input at crucial moments in the game. Instead of controlling overlaid characters, players made quick decisions and interacted with precise timing to avoid sequences that ended in the player character's death. This type of game is also sometimes called an *interactive movie*.

The most famous of these types of games was *Dragon's Lair* (1983), by computer consultant Rick Dyer, who had teamed up with Cinematronics and former Disney animator Don Bluth to create the game. *Dragon's Lair* featured a knight, Dirk the Daring, who fought various creatures and had adventures, the outcomes of which were partially determined by the player's input. With hand-drawn cel animation from Bluth, the game's graphics were far better than the usual arcade game imagery. The novelty interested players and arcade operators, who hoped laserdisc technology could revive the arcade game industry's sagging profits. Other games with hand-drawn animation appeared in 1983; two anime-based games, Nihon Bussan/AV Japan's *Bega's Battle* and Stern's *Cliff Hanger*, both had action-packed narratives with branching storylines. Two other games from 1983 added another element of player choice: Bally/Midway's *NFL Football* and Stern's *Goal to Go*, were both football games with live-action video; players selected plays and then the teams were shown running them.

During the video game industry crash of 1983, laserdisc games inspired hope, and more than a dozen companies produced games in 1984. Cinematronics, Dyer, and Bluth returned with *Space Ace*, a science fiction–themed game, and Dyer's own company, RDI Systems, also produced the adventure game *Thayer's Quest*. Other games of the year included adventure games (Funai's *Esh's Aurunmilla*, Universal's *Super Don Quixote*, and Taito's *Ninja Hayate*), shooting games (Laserdisc Computer System's *Atomic Castle*, Konami's *Badlands*, Nihon Bussan/AV Japan's *Cobra Command*, Atari's *Firefox*, and Mylstar's *Us v. Them*), racing games (Taito's *Cosmos Circuit* and *Laser Grand Prix*, SEGA's *GP World*, and Universal's *Top Gear*), one sports game (Stern's *Gold Medal with Bruce Jenner*), and the only abstract laserdisc game (Simutek's *Cube Quest*).

Because of derivative games and expensive technology that frequently broke down, laserdisc games failed to revive the arcade. The games' limitations were also to blame; prerecorded imagery meant games could only vary slightly from one playing to another, if at all. Once players had seen everything, they lost interest, so the games had little replay value and no staying power.

For the same reasons, home laserdisc game systems also failed. In January

1985, RDI Systems released the Halcyon home system, which cost more than $2,000 and had only two games for it, an expanded version of *Thayer's Quest* and *Raiders v. Chargers*, which used real NFL game footage. Four more games were planned, but the company went bankrupt before their release. Microsoft's MSX home computer, released in Japan in 1983, used certain laserdisc players from Pioneer and Sony to play laserdisc games, and eleven games (*Astron Belt*, *Strike Mission*, *Badlands*, *Starfighters*, *Umi Yakuba*, *Interstellar*, *Cosmos Circuit*, *Esh's Aurunmilla*, *Rolling Blaster*, *Mystery Disc 1: Murder, Anyone?*, and *Mystery Disc 2: Many Roads to Murder*) were released for the MSX and available only in Japan.

The late 1980s saw only a few more games released, including SEGA's space game *Albegas* (also known as *Cybernaut*), Status's *Casino Strip*, Nihon Bussan/AV Japan's *Road Blaster* (also known as *Road Avenger*), and Taito's *Time Gal*, all from 1985, and Millennium Games' *Freedom Fighter* from 1986. From the late 1980s onward, raster games with three-dimensional graphics were improving and offering more variety than the limited pre-rendered sequences of laserdisc games in which players could not control their point of view.

However, laserdisc technology attempted a comeback in the early 1990s. Namco produced two games, *Galaxian 3* (1990) and *Attack of the Zolgear* (1994), both space shooting games that sat six players in front of an enormous image stretching across three giant projection screens placed side by side in an enclosed booth, giving players a unique arcade experience. *Dragon's Lair II: Time Warp*, a sequel begun in 1984, was finally released in 1991 by Leland Interactive. Nova Games released a driving game, *Street Viper* (1993); Atari Games released the driving and shooting game *COPS* (1994), based on the television series; and SEGA released *Time Traveler* (1991), which reflected its laserdisc imagery in a parabolic mirror to simulate a 3-D effect. A Spanish company, Web Picmatic, produced a few games, including *Zorton Brothers (Los Justicieros)* (1993) and *Marbella Vice* (1994), and in 1993, Pioneer Corporation even released the Pioneer Laseractive home laserdisc game system, although by this time CD-ROMs were replacing laserdiscs as the technology for games using FMV.

The company most responsible for the attempted revival of the laserdisc game industry was American Laser Games. Started in the late 1980s, American Laser Games used better computer technology and produced a series of laserdisc games with light guns and live-action video, including *Mad Dog McCree* (1990), *Who Shot Johnny Rock?* (1991), *Gallagher's Gallery* (1992), *Mad Dog II: The Lost Gold* (1992), *Space Pirates* (1992), *Crime Patrol* (1993), *Crime Patrol 2: Drug Wars* (1993), *Fast-Draw Showdown* (1994), *The Last Bounty Hunter* (1994), and *Way of the Warrior* (1994). A tenth game, *Shootout at Old Tucson*, did not make it to the arcade but was released on CD-ROM instead.

Technologically speaking, the revival efforts were too late. By 1992, CD-ROMs were incorporating FMV in computer games, and in 1997, the first consumer DVD equipment became available, sounding the death knell for laserdisc technology. Probably the last arcade video game to use a laserdisc was Nihon Bussan/AV Japan's *Burning Rush* (2000), which only used it for its opening and closing sequences and cutscenes.

Games using FMV, however, continued for home computers and console systems. In 1997, the company Digital Leisure, Inc., was formed for the purpose of rereleasing laserdisc games on DVD. It bought the rights to *Dragon's Lair*, *Space*

Ace, and *Dragon's Lair II: Time Warp*, which it released over the next couple years on CD-ROM, DVD-ROM, and the Sony PlayStation 2. In 2000, Digital Leisure bought the rights to SEGA's *Time Traveler*, and in 2001, it acquired the rights to all nine arcade games made by American Laser Games, rereleasing them as well. Today, a number of laserdisc games can be played on emulators, such as Daphne (www.daphne-emu.com).

Laserdisc games had a brief history because of the quickly changing technology of optical storage media, but they introduced FMV into video games and are now fondly remembered by collectors. The games themselves are still sold and played on other media.

Mark J. P. Wolf

See also: GCE/Milton Bradley Vectrex

Further Reading

Kinder, Jeff, et al. Dragon's Lair Project website. Accessed September 21, 2020. Available at http://www.dragons-lair-project.com.

Wolf, Mark J. P. "Laserdisc Games." In *The Video Game Explosion: A History from PONG to PlayStation and Beyond*, edited by Mark J. P. Wolf, 99–102. Westport, CT: Greenwood Press, 2007.

Latin America

In terms of game hardware development, Latin America has mainly focused on manufacturing and adapting foreign designs. One of the most important examples is Brazil, which has been a producer of both consoles and computers for the region. In 1985, Microdigital Electronica created the TK90X, a clone of the Sinclair ZX Spectrum, which was an extremely popular European platform in the 1980s. Tec Toy, another Brazilian company, manufactured all of SEGA's consoles for the South American market, from the SEGA Master System to the SEGA Dreamcast. In 2011, Microsoft announced that it would start manufacturing its Microsoft Xbox 360 systems in Brazil.

There are some examples of modifications and examples of existing consoles. Probably the first case (circa 1975) is the Argentinean Telematch—not to be confused with U.S. contemporary console Tele-Match—manufactured by Panoramic, a local maker of TV sets. The Telematch was basically a bare-bones clone of the Magnavox Odyssey (1972) that had been stripped down from its accessories and from many of its games. However, the Telematch was not just a copy: it was hacked to include two extra knobs for controlling a brand-new game not included in the original Odyssey. The game was *Soccer*, a *PONG*-like game with two paddles; one paddle represented a player and the other represented the goalie. Goalkeepers were controlled by the extra knobs. Although this was one of the very first soccer console games, it was not the first; in 1974, Magnavox launched an export version of the Odyssey for the non-U.S. market that included soccer. However, it was different from the game on the Telematch.

In 2009, Tec Toy (later Zeebo Inc.) launched the Zeebo, a game console conceived for emerging markets. Even though it was a TV-based console, its basic technology was mobile, and the games were distributed wirelessly through 3G. The machine included versions of hit game series such as *Resident Evil* and *FIFA Soccer*. According to the company's website, it was discontinued in 2011.

In terms of game software, there is not yet a comprehensive study of the continent's production. The high levels of piracy may be one of the main reasons a local game software industry took so long to take off. Few studios in the 1980s and 1990s managed to distribute their games in the United States and Europe, even though the situation has recently changed because of online distribution.

Gonzalo Frasca

See also: Argentina; Brazil; Chile; Colombia

Further Reading

Orland, Kyle. "Microsoft to Manufacture Xbox 360 in Brazil, Reduce Local Price." Gamasutra, September 28, 2011. Available at http://www.gamasutra.com/view/news/37513/Microsoft_To_Manufacture_Xbox_360_In_Brazil_Reduce_Local_Price.php.

Wolf, Mark J. P., ed. *Video Games around the World*. Cambridge, MA: MIT Press, 2015.

Latinos and Video Games

There seems to be no limit when it comes to video game content—except when content is placed under the headings of race and ethnicity. The presence of African Americans, Native Americans, Asian Americans, and Latinos remain few and far between. When they do appear, it is usually as a nonplayable character, an obstacle to overcome, or simply part of the background—not just as bodies but also in the form of hip-hop and rap soundtracks. When given a greater playable presence, they typically appear as fighters, athletes, gangbangers (African Americans and Latinos especially), model minority nerds (Asian Americans), and preternatural vision questers: for example, the Cherokee Domasi Tawodi in *Prey* (2006) whose shamanic DNA saves the day—even in outer space.

Like other so-called racial groups, playable Latinos in video games remain largely fixed to their physicality; they are all body and no mind. They appear most abundantly in fighting games (arcade games later ported for game console play) and without much discrimination between country or region. Latinos either originate from the Iberian Peninsula or from Latin America. Several such player characters include the Spanish-speaking (with an odd Japanese cadence) *luchador* (wrestler) Ramon as El Diablo Amarillo (or "The Yellow Devil") in *The King of Fighters 2000* (2000); the aspiring gourmet chef and luchador El Fuerte in *Street Fighter IV* (2009); the Spanglish-talking, hero-of-the-poor luchador Tizoc in *The*

King of Fighters (2003); the masked, talon-wielding Ninjutsu matador warrior Vega the Spanish Ninja in *Street Fighter II* (1992) and *Street Fighter Alpha 3* (1998); and the Brazilian Capoeira fighters Eddy Gordo and Christie Monteiro (turned Anglo in the 2010 film adaptation) in *Tekken 3* (1997) and *Tekken 4* (2002). There is also the matador-styled warrior Miguel Caballero Rojo in *Tekken 6* (2009), Pepe José Rodriguez in *Rage of the Dragon* (2002), and Ricky Ortiz in *Super4* (2010). Last but not least, there is the Charro-hat-wearing, plant-shapeshifter, fighter cactus Anmigo in *Marvel v. Capcom 2: New Age of Heroes* (2000).

When not duking it out in the ring or dribbling soccer balls, Latinos typically appear as knife-wielding, ominously dangerous types. For instance, in Rockstar's *Warriors* (2005; an adaptation of Walter Hill's film *The Warriors* [1979]), players manipulate a multiracial cast of gangbangers whose biggest obstacle in returning home to Coney Island is to defeat a Spanish Harlem Latino gang called the Hurricanes. The win-or-lose deathmatch takes place against the gigantic gang leader, Diego.

When not a marauding gang in need of a good pummeling, urban-set single-player and multiplayer video games typically place Latinos in the background streetscape for a verisimilar ghetto look. Rockstar's *Grand Theft Auto (GTA): San Andreas* (2004) was ahead of the curve here in terms of bringing Latinos and African Americans into the foreground. *GTA: San Andreas* introduced the playable African American character Carl Johnson from Grove Street, Los Santos. However, although Latinos do appear, they are members of his gangbang dream team and include Carl's sister's boyfriend, Cesar, and the Chicana gangbanger Catalina. In *GTA: Vice City* (2002), designers include important Latino characters such as Juan Garcia Cortez, who helps mafioso Tommy Vercetti climb back into the cocaine trade business.

Of course, these are still negative representations of Latinos, but we see Rockstar moving Latinos out of the shadows, paving the way for a watershed in 2010. Rockstar designers introduced the playable Dominican American character Luis Lopez in *GTA: Ballad of Gay Tony* (2010). Luis not only takes the playable center stage but does so as a coolheaded, smart character. Rockstar sheds yesteryear's Latino stereotype of sex-crazed thug and psychopath. Within the kill-or-be-killed dystopia of Liberty City, Luis is the only voice of reason, and it is his coolheaded, logical decision making that wins the game.

Much like *GTA: San Andreas*, Volition's *Saints Row* (2006) also brings to fore playable "racial" characters. Here, however, more choice is offered: the player can choose the character's ethnicity and gender as well as facial flesh and bone structure, hairstyle, voice, clothes, tattoo art, and body piercing. Then the player character escapes prison with Carlos Mendoza, a fellow inmate, and hits the road with all variety of weapons and chop-shopped vehicles. Like Rockstar's *Warriors*, as a member of the gang 3rd Street Saints, the player character has to defeat a variety of Latino gangbangers, such as the scar-faced drug kingpin, Hector "Kimo" Lopez; the macho, hot-tempered younger brother, Angelo Lopez; the pesky shoe-obsessed girlfriend, Luz Avalos; the Spanish-speaking muscle, Victor "Tanque" Rodriguez; and the drug lord, Manuel Orejuela (voiced by Carlos Ferro). Despite nuances in the way one builds up the player character's gangbanger look, once again, Latinos are ultimately presented as obstacles to overcome; they must die to win the game.

Ghetto-set video games are not the only place for Latinos, playable or otherwise; several rural-set games feature Latinos with varying degrees of playability. For instance, Deadline Games' *Total Overdose: A Gunslinger's Tale in Mexico* (2005) requires the player to fulfill three missions, and all in the shoes of Latino characters: first, as Ernesto Cruz (father), the player has to take down the Los Toros' drug kingpin, Papa Muerte; second, as Ernesto's son Tommy, the player has to defeat the Virgillio gang; and third, as Ernesto's other son, Tommy's twin and DEA agent Ramiro "Ram" Cruz, the player has to outsmart and outmaneuver crazy *luchadores* (wrestlers), corrupt military, pimps, dealers, and banditos. The ultimate goal is to bring down the Morales Cartel. (The playable Latino father-and-sons triad also appear in the spin-off *Chili con Carne* [2007] for the PlayStation Portable [PSP].)

And there are video games set completely in rural regions with gameplay dependent on encounters with Latinos, such as HPS Simulation's *The Mexican American War* (2000). Set during various historic nineteenth-century battles with Mexico, such as that of San Jacinto, the player is an Anglo foot soldier who has to strategize moves (e.g., whether to blow up bridges) with the goal of defeating the Mexican army. Rockstar's multiplayer *Red Dead Redemption* (2010) makes a similar move, albeit less historically; the player steps into the shoes of renegade Anglo cowboys or the Native American Shadow Wolf to save innocent townfolk under siege by a Mexican army. Finally, arguably at the farthest extreme of nonurban video games that portray Latinos one way or another, there is the playable Manny Calavera, a stilt-walking Day of the Dead grim reaper in Lucas Arts Entertainment's *Grim Fandango* (1998). Manny lives in the Land of the Dead, where he works as a travel agent for the Department of Death. The player's objective is to overcome obstacles and use strategic thinking to get Manny to the Land of Eternal Rest.

Online games feature Latinos, but they do so at the extreme edge of the design representational spectrum. Created by self-proclaimed "anti-Mexican bigots," *Border Patrol* (2002) aims to open eyes to the everyday violence against Latinos, human rights violations, and racist policy making behind anti-immigration laws. While a clock ticks, the player is put into the uncomfortable position of shooting border crossers, and the game's cartoonlike graphics and general design aims to caustically poke fun at racists. Breakthrough's *ICED: I Can End Deportation* (2007) is arguably meant to raise awareness by allowing the player to feel what it is like to live as an undocumented Latino. Ultimately, however, *ICED* falls back on racist stereotypes; you play an undocumented teen running from the migra but score points by *not* jumping subway turnstiles and *not* stealing from local *tiendas*. The points keep you from being deported. The expectation is that stealing and taking advantage of the system is in the Latino DNA.

Then there are games that do not pretend to be anything but racist. The use of caricature in Resistance Records' *Ethnic Cleansing* (2002) aims to feed bigotry. The game's stated goal is to kill "subhumans," such as African Americans who make monkey noises, Jews who cry "Oy vey!," and poncho-wearing Latinos who shout "Ay carumba!"

Latinos do appear in sports games. Not surprisingly, given the strong interest in soccer, or *fútbol*, you can now play games such as Electronic Arts' *FIFA 10* (2009) in Spanish and play a wide range of popular Mexican and Latin American teams. *Madden NFL 08* (2007) and *Madden NFL 09* (2008) can also be played in Spanish. The famed Latino BMX-er, Mike "Rooftop" Escamilla, is a character in Activision's *Mat Hoffman's Pro BMX 1* (2001), *Mat Hoffman's Pro BMX 2* (2002), and *Shaun Palmer's Pro Snowboarder* (2001). Latinos are few and far between, but Latinas are nearly nonexistent. A rare playable Latina character, Lisa, appears in the beach-set sports game *Dead or Alive: Paradise* (2010); her background occupations include being a scientist, a stockbroker, and a *luchadora* called "La Mariposa."

Some sci-fi games contain an extrapolation of real life for Latinos, such as the presence of the U.S.-Mexico border. Gearbox Software's *Borderlands* (2009) is set on Pandora, a barren wasteland of a planet controlled by global megacorporations (much like the *maquiladoras* along the Mexican side of the border); its people scavenge colossal trash heaps (like those in Tijuana) to survive. *Gears of War* (2006) features a playable Latino character, Dominic "Dom" Santiago (voiced by Carlos Ferro). Although he is born on the planet Sera and raised in Ephyra city in his homeland of Tyrus, his name and phenotypic look mark him as Latino. Dom, along with Asian characters such as Minh Kim and Tai Kaliso as well as African Americans such as Augustus Cole, seeks revenge against the killers of his children, Sylvia and Benedicto, and his brother, Carlos, and torturers of his wife, Maria.

A staunch advocate for increased representation of Latinos in video games, David Leonard goes after the *GTA* series, sharply critiquing its "demonization of Latino immigrants as economic parasites" (Leonard 2010, 93). Leonard identifies *GTA* as typical of video games that identify Latinos as the "evil" seed that has grown all the nation's social ills. He even notes that when the radio station in *GTA: San Andreas* is not blasting rap and hip-hop, it is announcing all variety of racist invectives: "Notice food lines are getting too long. Wonder why? Nineteen million illegal aliens are in this country. Most are in San Andreas."

In the same critical vein, scholars have considered the sociological and even biological impact of negative racial stereotyping in video games. Several working in the cognitive and neuroscience fields found that video game play can lead to (not necessarily as a strong causal correlation) the growing and solidifying of in-group and out-group appraisal schemas, so playing video games in which Latinos are only represented as gangbangers or only identified as obstacles to be avoided, overcome, or destroyed can solidify exclusionary practices in the real world. For instance, research by John T. Cacioppo et al. (2005) using fMRI and ERP imaging technology to measure the emotional processing of different racialized facial expressions finds that anger expressed in racialized groups such as Latinos and African Americans triggers a negative and exclusionary evaluation in Anglos, whereas their responses to anger expressed in other Anglo faces solidifies positive in-group identification. Again, although cause-and-effect relationships are complex and strict correlations unlikely, video game design can and does have an impact on in-group and out-group emotion appraisal and identification.

The jury is still out on causal relations between media representations and real-world acts and identifications, but we can say for certain that video games that represent Latinos exclusively as athletes, fighters, or gangbangers are simply unimaginative. Beyond the fairness of balanced representation, when playing a video game, watching a film, or reading a novel, variation is of the essence. Game design resorts to characterization, wordplay, types of action, point of view, and myriad other devices to furnish the brain the variety in stimuli it needs to remain awake and alert. Also, Latino game designers are few and far between. For instance, out of a team of 250 designers who worked on the video game adaptation of *Toy Story 3* (2010), only two were Latino, Gabriel Ávila and Alex Olmos, although there are some well-known and influential designers, such as John Romero.

Statistically, Latino children play more video games than Anglo children, yet only about 2 percent of video games include Latino characters. Some in the video game industry have already tuned into this, such as the national video game chain GameStop. Its bilingual "Viva GameStop!" ad campaign is spotted on Univision and Telemundo. Also, Standalone brought out *SingStar Latino* (2009), in which where you can have vocal showdowns singing along to Ana Torroja, Azcucar Moreno, Coti, Heroes Del Silencio, Jon Secada, La Oreja De Van Gogh, Patricia Manterola, and Paulina Rubio.

Frederick Luis Aldama

See also: Race

Further Reading

Cacioppo, John T., Penny S. Visser, and Cynthia L. Pickett. *Social Neuroscience: People Thinking about People*. Cambridge, MA: MIT Press, 2005.

Kolko, Beth E., Lisa Nakamura, and Gilbert B. Rodman, eds. *Race in Cyberspace*. New York: Routledge, 2000.

Leonard, David. "Video Games Promote Racism." In *Video Games*, edited by Laurie Willis, 81–95. Farmington Hills, MI: Greenhaven Press, 2010.

Laurel, Brenda (1950–)

Brenda Laurel is an American game designer and a leading expert on human-computer interaction. Laurel began working in video games, producing interactive fairy tales at Cybervision, as a way to earn money while completing her PhD in theater. In 1986, she completed her PhD with research on immersive storytelling that drew extensively from her work at Atari Research Labs. In 1988, she cofounded the Game Developers Conference.

Launched from her 1980s work at Atari and Activision, Laurel has established herself as a leader in games, consulting broadly in games and media at such places as LucasArts, Apyx, Brøderbund, Paramount New Media, Apple, and Sony Pictures, among others. She is also the cofounder of Purple Moon, a game company at the center of the 1990s games for girls movement.

Purple Moon was a spin-off from work that Laurel did at Interval Research Corporation, where she oversaw a multiyear study that looked at the relationship between gender and technology among children and youth. Part of the revolutionary approach that enabled Purple Moon to be such a success was that, first, Laurel took eight- to twelve-year-old girls seriously as a market, and, second, she used research-driven design, which relied on careful social science methods with the target audience that asked their preferences and desires as part of the design process, for both the *Rockett Movado* series and the *Secret Path* series. Laurel also used transmedia approaches to create community spaces online and in products.

Laurel has written numerous books, including *The Art of Human-Computer Interface Design* (1990), *Computers as Theatre* (1991 and 2013), *Design Research: Methods and Perspectives* (2003), and *Utopian Entrepreneur* (2001). Specifically, *Computers as Theatre* is a foundational work in the field of immersive HCI, asking people to think of computers as humanistic poetic systems and not just technical challenges. Drawing heavily on Aristotle's poetics and her own work both in games and immersive tech, Laurel strongly argues for a holistic system that is multisensory. She puts this argument into practice in her much-celebrated virtual reality (VR) exhibit *Placeholder: Landscape and Narrative in a Virtual Environment* (1994), codirected with Rachel Strickland and produced by Interval Research Corporation and the Banff Centre for the Performing Arts. Rather than focusing on sight, as most VR developers do, Laurel and her codirector designed systems for the whole body to be engaged and transformed in virtual environments, asking people to interpolate themselves as different animals and act in the world through those animal movements.

The early 2000s saw Laurel's career shift once again as she became an educator, first as the graduate director at the Media Design Program at the Art Center College of Design in Pasadena (2001–6) and then as the founding chair of the graduate program in design at the California College of the Arts. She also continued to work in the industry, including a stint as distinguished engineer at Sun Microsystems Labs, where she worked on a new user interface for television and film (patent awarded in 2010). Since leaving higher education, she has continued to consult, speak, and mentor others in games. Her book *Utopian Entrepreneur* (2001) can be read as a long postmortem of her work and years at Purple Moon—work that is being rediscovered as contemporary scholars shine a spotlight on the games for girls movement.

Jennifer deWinter and Carly A. Kocurek

See also: Girls' Games

Further Reading

Kocurek, Carly A. *Brenda Laurel: Pioneering Games for Girls*. London: Bloomsbury, 2017.

Laurel, Brenda. *Computers as Theatre*. Boston, MA: Addison-Wesley Professional, 2013 [1991].

Laurel, Brenda. *Design Research: Methods and Perspectives*. Cambridge, MA: MIT Press, 2003.

Laurel, Brenda. *Utopian Entrepreneur*. Cambridge, MA: MIT Press, 2001.

Laurel, Brenda. "Why Not Make Video Games for Girls?" TED Talk, 1998. Available at https://www.ted.com/talks/brenda_laurel_why_not_make_video_games_for_girls.

Lebanon

A group of Lebanese developers came out with their first video game, *Special Force* (2003), which focused on Hezbollah military operations against Israeli occupation forces in Lebanon. The game was quickly adopted by Hezbollah and merged into its propaganda machine. The outcome was a short video game (three levels) with mixed messages of religion and politics. That attitude led to the ban of this game in many Middle Eastern countries; however, it gained a lot of media attention, and the developers were rewarded with more resources to come up with a sequel in 2007. The developers established their new studio, Might 3D, and created *Special Force 2: Tale of the Truthful Pledge* (2007), which was based on the 2006 Lebanon War between Hezbollah and Israel. It was presented less than a year after the actual war, and the game was in Arabic, with an unofficial patch to add English subtitles.

Independent critics tend to compare these games to *America's Army* (2002) because both are funded by political parties to promote specific views (*America's Army* is funded by the Pentagon). Apart from the political background of the *Special Force* series, which was controversial but did not boost sales, credit should go to the series' developers because they started out using the Genesis 3D engine for their first game and then managed to develop their own game engine for *Special Force 2*.

Apart from politically themed games, in 2007, Wixel Studios was founded by Ziad Feghali and Reine Abbas (the only female game designer in the Middle East) and started producing casual mobile games. Its most notable game is *Antura* (2017), an award-wining educational game. Other companies, such as GameCooks, founded in 2011 by Lebnan Nader, built their success stories by developing mobile lottery games.

In 2010, Falafel Games was founded in HangZhou, China, by industry veteran Radwan Kasmiya and Vince Ghossoub, with the goal of redesigning popular Chinese strategy games and introducing them to Middle Eastern players. The company's first game, *Knights of Glory* (2011), a massively multiplayer online (MMO) browser game about Muslim conquests, became very popular among players in the region with over two million installs, which led to this start-up securing USD 2.6 million, the highest round of investment a game studio has received in the Middle East (as of 2018). The company has offices in the United Arab Emirates and China and headquarters in Lebanon.

Pou (2013), a Tamagotchi mobile game created by Paul Salameh, a former chief technology officer (CTO) of Falafel Games, eventually reached the fourth rank among top games by all-time worldwide downloads on Google Play in 2018.

Radwan (RAD) Kasmiya

See also: Middle East

Further Reading

Antura website. Accessed September 21, 2020. Available at http://www.antura.org.

Falafel Games website. Accessed September 21, 2020. Available at http://www.falafel-games.com.

GameCooks website. Accessed September 21, 2020. Available at https://www.gamecooks.net.

Pou website. Accessed September 21, 2020. Available at http://www.pou.me.

Wixel Studios website. Available at https://www.wixelstudios.com.

Legend of Zelda, The Series

The Legend of Zelda is a series of fantasy-themed action-adventure games created by designers Shigeru Miyamoto and Takashi Tezuka and developed and published—with only a few exceptions—by Nintendo. As of 2019, the series included eighteen major titles as well as a number of spin-offs, remakes, and ports, spanning all the company's major platforms. Alongside the *Mario* and *Metroid* series, it is one of Nintendo's key properties, and with over eighty million copies sold globally, it is one of the most successful game franchises in history.

A screenshot from *The Legend of Zelda: Breath of the Wild*. (Courtesy of Mark J. P. Wolf)

Combining free-roaming exploration, questing, combat, puzzle solving, and light role-playing elements, the series has played a pivotal role in establishing and refining the hybrid design of the modern action-adventure genre. Most entries share the core cast of archetypal characters, setting, basic themes (coming-of-age, good versus evil), and ludonarrative structure. The player takes the role of an Elven boy named Link and embarks on a quest to rescue Princess Zelda and restore order to the land of Hyrule by defeating the villainous brigand king, Ganon. The task typically involves the recovery of a number of magical artifacts that are scattered throughout the game world. Central among them is the ancient relic Triforce, which bestows great power on its bearer. Although set in a single universe, the events of individual games often take place hundreds of years apart or in alternate timelines, with key characters' names and roles being passed down across generations (e.g., every female descendant of the Hyrulian royal family is named Zelda). Consequently, the exact chronology of the events taking place in the series has been the subject of much speculation and debate.

Released in 1986, *The Legend of Zelda* was developed as a launch title and "killer app" for the Famicom Disk System, a floppy disk drive peripheral for the Nintendo Family Computer (see Nintendo Entertainment System/Nintendo Famicom) exclusive to Japan. Developed alongside *Super Mario Bros.* (1985), the game reflected a radically different design philosophy. Taking full advantage of the increased size (compared with cartridge technology of the time) and rewritability of the floppy disk medium, it eschewed unidirectional progression through a series of levels in favor of largely nonlinear traversal of a sprawling open world that continued across multiple play sessions thanks to save functionality.

Outside of the brief expository narrative provided in the game manual, which tasks the player with the recovery of eight pieces of the Triforce of Wisdom to save Princess Zelda and prevent Hyrule from falling under control of the evil Ganon, the game offers little guidance, instead encouraging—and rewarding—exploration and experimentation. Accomplishing the goal requires the player to navigate the sprawling "overworld" and nine labyrinthine underground dungeons (presented from a flip-screen top-down perspective) in search of Triforce shards and other items, interact with a number of non-player characters (NPCs), solve puzzles, and battle a wide variety of monsters.

For its 1987 North American and European releases, the game was ported to cartridge format. To retain the save game feature, the cartridge was equipped with battery-backed memory—the first NES title to utilize such a solution.

The Legend of Zelda established the basic gameplay mechanics for subsequent games and introduced a number of elements that have since become staples of the series, such as the overworld/dungeon structure or the "second quest," a more difficult version of the adventure that is unlocked upon the completion of the normal mode. Moreover, the game had significant impact on the development of both the action-adventure and action role-playing game (RPG) genres and is widely considered one of the most influential games in history.

Like its predecessor, *Zelda II: The Adventure of Link* (1987) was first released in Japan for the Famicom Disk System, and the following year, it was released on cartridge in North America and Europe. A direct sequel set several years after the events of the first game follows Link's quest to wake Princess Zelda from magically induced sleep while preventing Ganon's followers from bringing their master back to life. Created by a different development team (albeit still under Miyamoto's supervision), *Zelda II* features several design modifications. Perhaps the most obvious of these is the change in perspective: the majority of the gameplay (combat, dungeon exploration, character interaction) takes place in side-scrolling view, with top-down presentation retained only for travel through the (now much larger) overworld. The other major alteration is the addition of a number of elements characteristic of RPGs, such as spells, experience points (used to increase vitality, combat prowess, and magical abilities), and increased NPC interaction (with characters now offering side quests). The simplistic hack-and-slash combat style of the original is replaced with a more strategic system. Although not all changes were well received, the game was commercially successful, and many of the new elements (including the Triforce of Courage, Dark Link, side quests, and magic system) went on to become permanent features of the series.

The Legend of Zelda: A Link to the Past began development as an NES game; but it was ultimately released in 1991 for the Super Nintendo Entertainment System (SNES). Taking place centuries before the events of the previous titles, the prequel centers on Link's attempt to prevent the release of Ganon from a parallel dimension, the Dark World, in which he had been imprisoned for hundreds of years. Compared with its predecessors, *A Link to the Past* features a richer story as well as a more detailed—and more densely populated—world. The game returns to the overhead perspective of the original but introduces further additions and refinements to the formula: the alternate world, multilevel dungeons, new weapons and equipment (such as the now iconic Master Sword and the hookshot), and Link's signature spin attack, to mention just a few. In 2002 (North America) and 2003 (Japan and Europe), the game was rereleased for the Game Boy Advance handheld as part of *The Legend of Zelda: A Link to the Past & Four Swords*.

Originally announced as a launch title for the Nintendo 64 console, *The Legend of Zelda: Ocarina of Time* (1998) went through a long and rocky development period (at one point, the game was moved to the Nintendo 64DD, the ill-fated magneto-optical disk drive peripheral for the N64) before arriving at its 1998 release. Utilizing a modified *Super Mario 64* game engine, the title marked the franchise's transition into three-dimensional graphics. Once again dispatching the player on a quest to foil Ganon's plot to obtain the Triforce, *Ocarina* is set before all earlier installments and takes place in two separate time periods, allowing the player to control Link as a child and young adult. Because certain tasks in the game can only be completed in one of these incarnations (e.g., child Link is able to tame Epona, the horse, but only adult Link can ride her), progressing through the game often necessitates properly coordinating actions between the two. One of *Ocarina*'s distinguishing characteristics is its extensive use of music as a gameplay element, as the titular woodwind becomes instrumental to puzzle solving, exploration, and travel. It is also notable for its innovative control scheme, which is designed to make movement and combat in three-dimensional space more manageable through such features as target lock (whereby pressing the Z-button on the controller latches Link onto the opponent, eliminating the need for manual aiming) and context-sensitive buttons (allowing the same button to trigger different actions, depending on the situation). *Ocarina of Time* is often hailed as the definitive *Zelda* title and one of the greatest games ever made.

Picking up several months after the end of *Ocarina*, *The Legend of Zelda: Majora's Mask* (2000) sends Link to the parallel world of Termina, where he finds himself with just three days to save the land from imminent destruction by its own falling moon. Building on the time travel mechanic introduced in the previous game, *Majora's Mask* allows the player to return at will to the beginning of the three-day period, extending the window of opportunity to avert the cataclysm as needed. (Although extremely difficult, it is in fact possible to complete the game in just two cycles.) Because many of the character interactions—and the resultant side quests—are only available at specific hours, the temporal loop adds a time-management component to gameplay. Another new feature is the twenty-four magical masks that transform Link into other characters or grant him special abilities. Uncharacteristically, the game features neither Ganon nor Princess Zelda.

Developed for the Nintendo GameCube and sporting a new cel-shaded look, *The Legend of Zelda: Wind Waker* (2002 in Japan; 2003 in North America and Europe) returns to the familiar task of obtaining the Triforce and defeating Ganon. Its story begins more than one hundred years after the events of *Ocarina of Time* and takes Link on a journey across a series of islands scattered in a vast ocean. Like *Majora's Mask*, *Wind Waker* retains basic gameplay elements and controls from *Ocarina of Time*, but in keeping with the new setting, it replaces horse riding with sailing as the primary means of transportation between locations. Music continues to play an important function; Link gains the ability to control winds by conducting appropriate songs with the eponymous Wind Waker, a magical baton.

The Legend of Zelda: Twilight Princess (2006) was Nintendo's last GameCube game and one of the North American launch titles for the Nintendo Wii. The plot—roughly contemporaneous with the events of *Wind Waker*, albeit set in an alternate timeline—revolves around Link's quest to save Hyrule from destruction by the forces of the Twilight Realm, a parallel world of shadows. Although using a modified *Wind Waker* engine, *Twilight Princess* features a more realistic, richly detailed visual style. In the GameCube version, the control scheme introduced in the *Ocarina of Time* remains largely unchanged. The Wii port, on the other hand, takes advantage of the motion sensors and built-in speaker of the Wii Remote (for instance, allowing the player to aim Link's bow by pointing the controller at the target or perform a shield attack by thrusting the Nunchuk attachment). Markedly more violent than previous games in the series, *Twilight Princess* is the first Zelda game to receive a Teen rating from the Entertainment Software Rating Board (ESRB).

Beginning with the 1993 release of *The Legend of Zelda: Link's Awakening* for the Nintendo Game Boy, the franchise expanded onto portable platforms. Initially an unofficial side project, the game was conceived as a port of *A Link to the Past* before evolving into an original title. The player must assist the shipwrecked Link in seeking out the eight magical instruments necessary to orchestrate his escape from the mysterious Koholint Island. The game's surreal, dreamlike atmosphere was inspired (according to director Takashi Tezuka) by David Lynch's *Twin Peaks*. Several new gameplay additions appear, including the song-learning mechanic, the ability to bind inventory items to buttons, and the fishing minigame. In 1998, the game was remade in color as *Link's Awakening DX* to promote the launch of the Game Boy Color (GBC).

The GBC platform received two more *Zelda* games, *The Legend of Zelda: Oracle of Seasons* and *The Legend of Zelda: Oracle of Ages*, released simultaneously in 2001. Codeveloped by Flagship (a subsidiary of Capcom) and Nintendo, the games were planned as part of a trilogy; eventually, the scope of the project was scaled down because of production difficulties. Both share identical controls, graphics, and sound (similar to those of *Link's Awakening*) as well as basic premise (to rescue the respective oracle), but they differ in focus and central mechanic. While the action-oriented *Oracle of Seasons* allows the player to manipulate the seasons, *Oracle of Ages* prioritizes puzzle solving and uses time travel as the defining gameplay element. The two titles can be played independent of one another or linked (via a password system or direct cable connection between two GBC handhelds), in which case one becomes the sequel to the other. The linked mode alters the plot to connect the two stories and features an extended ending.

The next Flagship/Nintendo cooperation, *The Legend of Zelda: Four Swords* (2002 in North America; 2003 in Japan and Europe), marked the beginning of a new subcycle in the franchise: the *Four Sword* series. Combining the gameplay and presentation of *A Link to the Past* with the art style of *Wind Waker*, the three games focus on a new antagonist, sorcerer Vaati, and the legendary Four Sword, a magical blade capable of splitting its bearer into four individuals. *Four Sword*, the first multiplayer *Zelda* adventure, requires cooperation of two to four players, each controlling a different incarnation of Link. The game syncs the cartridge with a Game Boy Advance port of *A Link to the Past* and interacts with the latter via a common player profile, for instance, by allowing skills acquired in one game to be used in the other. Nintendo's *The Legend of Zelda: Four Swords Adventures* (2004 in Japan and North America; 2005 in Europe), although released for the GameCube, straddles the fence between home and portable systems. The game allows one to four players to use Game Boy Advance handhelds as controllers, supplanting and extending the main screen. Two independent play modes are included: cooperative adventure in the vein of *Four Swords* and competitive battle. (Exclusive to the Japanese version is a third mode, a stamp rally race.) Bringing the *Four Sword* cycle to an end, *The Legend of Zelda: The Minish Cap* (2004 in Japan and Europe; 2005 in North America) serves as a prequel to the previous two entries. It was the last joint project of Nintendo and Flagship as well as the last *Zelda* game for the Game Boy Advance.

With *The Legend of Zelda: Phantom Hourglass* (2007), the franchise moved on to the Nintendo DS. A direct continuation to *Wind Waker*, *Phantom Hourglass* follows Link's efforts to rescue Tetra from the mysterious Ghost Ship and defeat its creator, Bellum. The game retains *Wind Waker*'s basic gameplay (split between sailing and on-foot exploration) and cel-shaded visuals but employs a new control scheme, taking advantage of the system's touchscreen and built-in microphone. The same features return in *The Legend of Zelda: Spirit Tracks* (2009), which, replacing *Phantom Hourglass*'s steamboat with a train, sends Link and Zelda on a mission to prevent the resurrection of the Demon King Malladus. As of 2019, the last three major releases in the series are *Skyward Sword* (2011), which concerns the origins of the Master Sword; *Tri Force Heroes* (2015), set several years after *A Link between Worlds*; and *Breath of the Wild* (2017), set at the end of the series timeline and released for the Nintendo Switch.

The franchise also spawned a number of spin-offs, including the ephemeral Broadcast Satellite (BS) games *BS Zelda no Densetsu* (1995–96) and *BS Zelda no Densetsu: Inishie no Sekiban* (1997)—based on, respectively, *The Legend of Zelda* and *The Legend of Zelda: A Link to the Past*. Available only in Japan via the Satellaview, a satellite modem add-on for the Super Famicom, the games were broadcast in weekly episodes and accompanied by streaming voice narration. As such, they were meant to be played in real time. Also of interest is *Link's Crossbow Training*, a 2007 shooting game using assets from *Twilight Princess* and sold in a bundle with the Wii Zapper.

Outside of the official canon, three *Zelda*-themed action-adventure games were released for the Philips CD-i. In 1991, Nintendo and Philips entered an agreement to jointly develop a CD-ROM add-on for the Super Nintendo Entertainment System (SNES). After the arrangement fell through, Philips was granted license to use five Nintendo characters (Link, Zelda, Ganon, Mario, and Luigi) in games for the CD-i platform. *Link: The Faces of Evil*, *Zelda: The Wand of Gamelon* (Animation Magic, 1993), and *Zelda's Adventure* (Viridis, 1994) were contracted out to independent developers and produced with minimal input from Nintendo. The games were supposed to showcase CD-i's multimedia capabilities (e.g., CD-audio playback and full-motion video [FMV]) but were crippled by limited funding, rushed development, and technical limitations of a system not designed as a dedicated game machine. Although critical and commercial failures, the CD-i games are notable as the only *Zelda* titles to appear on a non-Nintendo platform and, in the case of *The Wand of Gamelon* and *Zelda's Adventure*, the only games to make Princess Zelda the protagonist.

P. Konrad Budziszewski

See also: Nintendo

Further Reading

Hunt, Stuart. "The History of Zelda." *Retro Gamer* 51 (May 2008): 26–37.

Zeldapedia website. Accessed September 21, 2020. Available at http://zelda.wikia.com.

Zelda Wiki website. Accessed September 21, 2020. Available at http://www.zeldawiki.org.

LEGO Video Games

LEGO, the internationally popular building toy company, has released dozens of video games since 1995. These games span a wide range of genres and game systems and have met with varying degrees of success, including an extremely popular line of action/puzzle games created by Warner Brothers–owned publisher TT Games.

Although well established as a popular toy significantly before the appearance of video games, there were no LEGO video games until the mid-1990s, the first release being *LEGO Fun to Build* (1995), a collection of minigames for the obscure SEGA Pico system. The first PC game was *LEGO Island* (1997), a game that featured exploration, building, and an unfolding story. Over the next several years, LEGO established its own game publishing unit and released a variety of games for many different systems, including the car game *LEGO Racers* (1999), the amusement park simulator *LEGOLAND* (2000), and a series of games based on its popular Bionicle line of toys.

LEGO
BATMAN 3
GOTHAM E OLTRE

People playing *LEGO Batman 3* at Games Week 2014 in Milan, Italy. (Tixtis/Dreamstime.com)

In the early 2000s, the LEGO Group faced a significant financial crisis, running a major loss in 2003. As a result, new CEO Jørgen Vig Knudstorp adopted a business strategy that saw LEGO divest itself of businesses that it did not see as core to its brand, such as its entertainment parks and its video games. It shut down its publishing house and committed to partnering with developers and publishers rather than making its own games.

Jonathan Smith and Tom Stone left LEGO Interactive when it shut down and founded Giant Entertainment, which carried on the production of already-in-progress *LEGO Star Wars: The Video Game* (2005). In 2005, the studio merged with Traveller's Tales to form TT Games (which was later acquired by Warner Brothers in November 2007). *LEGO Star Wars* was a major success, both critically and financially, which led to a long string of games with similar gameplay using licensed characters and narratives, including *LEGO Indiana Jones: The Original Adventures* (2008), *LEGO Batman: The Videogame* (2008), *LEGO Harry Potter: Years 1–4* (2010), *LEGO Pirates of the Caribbean: The Video Game* (2011), *LEGO Marvel Super Heroes* (2013), and many more.

Movie license games, like *LEGO Star Wars*, typically follow the plot line of the film, while some of the licensed games, such as *LEGO Marvel Super Heroes: The Videogame* (2013), have original stories. Early games had no spoken words—the characters instead used a kind of emotive gibberish—but *LEGO Batman 2: DC Super Heroes* (2012) introduced voice acting. Gameplay consists of exploring areas in three-dimensional space, solving various logic and item-based puzzles, and cartoony, somewhat simplistic combat. Players can destroy many objects and collect studs (little single round pieces of LEGO) and other objects to measure progress and fulfill achievements. However, the games feature no real LEGO construction: players can sometimes trigger construction sequences, but it is impossible to do free building with pieces.

Although this set of games is the most successful, there are several other very different kinds of video games. For instance, there have been several LEGO massively multiplayer online games (MMOs), such as *LEGO Universe* (2010–12), *LEGO Minifigures Online* (2014–16), and *LEGO Worlds* (2017). In 2015, Traveller's Tales released *LEGO Dimensions*, a toys-to-life game that brought together characters from a wide range of television and movie franchises. All of these games required ongoing support (servers for the MMO and new toys and storylines for the toys-to-life game), but most did not last more than two years.

Not every LEGO video game has been a commercial or critical success, but the TT Games products have been a staple of the games industry for many years. With the success of LEGO movies and the resurgence of the brand since the early 2000s, LEGO is a powerful force in today's popular culture.

Kevin Schut

See also: Adaptation

Further Reading

Bertoli, Ben. "The Influence and Legacy of *Lego Island*." Kotaku, June 3, 2017. Available at https://kotaku.com/the-influence-and-legacy-of-lego-island-1795623638.

Davis, Johnny. "How Lego Clicked: The Super Brand That Reinvented Itself." *The Guardian*, June 4, 2017. Available at https://www.theguardian.com/lifeandstyle/2017/jun/04/how-lego-clicked-the-super-brand-that-reinvented-itself.

Rossignol, Jim. "TT Games: Immersed in Toys." Gamasutra, June 5, 2006. Available at http://www.gamasutra.com/view/feature/131124/tt_games_immersed_in_toys.php.

Let's Play Videos

Let's Play videos show personal game-related performances of players that are usually either uploaded to YouTube or streamed on streaming platforms (Karhulahti 2016). They have become a very popular phenomenon. They document a walkthrough and function as tutorials. At the same time, they are game reviews and are often accompanied by subjective player commentaries. Let's Play videos date back to 2004 and the Something Awful forums, a community known for their internet memes and engagement with online games (Glas 2015).

After the interest in Let's Play videos increased, Something Awful offered a subforum exclusively dedicated to these walkthroughs. Various Let’s Play genres have developed over time, but typical for all of them is that gameplay is commented on and a personal narrative of the player is often added. These genres include videos showing a player approaching a game for the first time, struggling with the interface or the gameplay, and demonstrating his or her strategies to find a way through the game. Others include cooperation between several players; for example, one player is playing, and another person is commenting. A typical genre is also the speedrun, which shows a player finishing the game as fast as possible. Speedruns show off a player’s prowess and his or her knowledge of the game, but they are also often about exploiting the game by using cheats or bugs.

Research on Let’s Play investigates both the viewers and the Let’s Play content producer. Burwell and Miller (2016, 2) specifically analyze the viewer and describe watching Let’s Play videos, not as a passive observation of someone playing but instead as participating “in a hybrid of game and video.” Egliston (2016) not only discusses the active role of the audience but also investigates “how different formats of broadcast communicate varying ontologies of videogame play[,] situating networks of material (and immaterial) relations.” He describes in which ways Let’s Play videos frame play as “thoroughly mediated” (see also Nguyen 2016). Let’s Play videos share features with livestreaming, as they both broadcast gameplay and add players’ commentaries to the performance. However, Let’s Play videos are prerecorded and edited and do not allow for direct real-time interaction with the player via a live chat.

Smith, Obrist, and Wright (2013, 131) focus on the content producer and discuss the “player as commentator” who is in control of the unfolding gameplay. They have observed that “the video game live-streaming community is not unified in content or practice but technology” (2013, 131). The Let’s Play community not only produces prerecorded videos but also livestream content and video-on-demand (often shared on YouTube as well).

Hector Postigo (2016) investigates the commentary that players present and how they accumulate “gamer capital.” Platforms such as YouTube and streaming services such as Twitch allow for monetization, the possibility to earn money from these productions by including advertisements, adding a link to a company, or referring to a brand in other ways. This has become a strategy by Let’s Play content producers to profit from their productions.

Karin Wenz

See also: Walkthroughs; YouTube

Further Reading

Burwell, Catherine, and Thomas Miller. “Let’s Play: Exploring Literacy Practices in an Emerging Videogame Paratext.” *E-Learning and Digital Media* 3, nos. 3–4 (2016): 109–125.

Egliston, Ben. “Broadcasting Play: Articulating Roles of Materialities and Bodies.” In *Proceedings of DiGRA Australia Queensland Symposium 2016*. November 17–18, 2016, Brisbane, Australia. Available at http://digraa.org/wp-content/uploads/2016/06/EGLISTON_BroadcastingPlayArticulatingRolesofMaterialitiesandBodies.pdf.

Glas, René. “Vicarious Play: Engaging the Viewer in Let’s Play Videos.” *Empedocles: European Journal for the Philosophy of Communication* 5, nos. 1–2 (2015): 81–86.

Karhulahti, Veli-Matt. “Prank, Troll, Gross and Gore: Performance Issues in Esport Live-Streaming.” In *Proceedings of 1st International Joint Conference of DiGRA and FDG*. Dundee, Scotland: Digital Games Research Association and Society for the Advancement of the Science of Digital Games, 2016. Available at http://www.digra.org/digital-library/publications/prank-troll-gross-and-gore-performance-issues-in-esport-live-streaming/.

Nguyen, Josef. “Performing as Video Game Players in Let’s Plays.” *Transformative Works & Cultures* 22 (2016). Available at http://doi.org/10.3983/twc.2016.0698.

Postigo, Hector. “The Socio-Technical Architecture of Digital Labor: Converting Play into YouTube Money.” *New Media & Society* 18, no. 2 (2016): 332–349.

Smith, Thomas, Marianna Obrist, and Peter C. Wright. “Live-Streaming Changes the (Video) Game.” In *Proceedings of the 11th European Conference on Interactive TV and Video*, 131–138. New York: ACM, 2013. http://doi.org/10.1145/2465958.2465971.

Localization

Game localization is a significant contributing factor behind the international status attained by video games. Game localization refers to the practice of translating and adapting a game for a given region (Chandler and Deming 2012) by serving it with a localized version of the game (known as *locale*). The term *localization* was derived from the word *locale* (small vicinity or area), which came to mean “a specific combination of geographical region, language and character encoding” (Esselink 2000, 1). This helps with making such distinctions as traditional versus simplified Chinese, depending on the target destination within Chinese-speaking markets, for example. Localization transforms a game into a version that is linguistically, culturally, and technically suitable for the target territory so that end users feel as if the game was originally made for them (O’Hagan and Mangiron 2013, 19). Mainstream games are routinely localized into multiple languages. The most profitable game to date, *Grand Theft Auto V* (2013), has been localized into fourteen languages. However, despite its relative economic significance to the game industry, game localization remains of marginal interest to game historians and scholars. In contrast to the well-chronicled history of games themselves (Kent 2001; Wolf 2007), the historical development of game localization is hazy, as there are few published sources that systematically trace and periodize its development (O’Hagan and Mangiron 2013). Because of the prominent position occupied by Japanese games in the formation of the game industry, the early history of localization coincides with the effort involved in bringing Japanese games to international markets (Kohler 2005; Consalvo 2016).

Game localization developed in parallel with software localization, which emerged in response to the spread of personal computers in the 1980s, when mostly U.S.-originated computer software and hardware had to be adapted to target market parameters. Applied to software, websites, and other products and services in electronic form, localization has become an integrated part of the global distribution of digital products in multiple language versions. Today, it is operationalized based on the framework of globalization, internationalization, localization, and translation (GILT). In particular, the internationalization process was developed to mitigate subsequent localization problems by addressing likely problems early in the production process that may be of a technical as well as a cultural nature.

Localization-friendly game development through internationalization would see games developed with localization in mind. For example, the use of the Unicode international character encoding system from the onset makes it possible for a U.S.-originated game to be localized into languages such as Chinese, Japanese, and Korean (CJK), whose large number of characters cannot be accommodated by the limited space in ASCII. Similarly, country- or region-specific age ratings as well as censorship need to be considered when games cross borders, involving an array of factors from religion to sociocultural and political issues, which are likely to be country specific. Internationalization helps mitigate subsequent costly reengineering of the game.

Game localization is a nontrivial, multifaceted process dictated by game publishers and developers that involves an increasing number of languages with high stakes in terms of return on investment. In particular, role-playing games (RPGs) and adventure games typically contain a high volume of texts to be translated, often including cinematic assets (cutscenes) to be subtitled or dubbed. A *full localization* entails dubbing and subtitling of cinematics in addition to the translation of other assets (elements), including in-game texts, user interface, art assets, and help files as well as legal and technical information and promotional materials. In addition, console games need to adhere to certain common terminology approved by the platform holders (e.g., Sony, Microsoft, and Nintendo). Furthermore, the challenges include a distribution model in which localized versions are shipped simultaneously with the original, making it necessary for localization to take place concurrently alongside game development. In this “sim-ship” (simultaneous shipping) model, localizers work with text that is not finished and constantly changing under severe time constraints. In contrast, the “post-gold” model allows the original game to be published first with localized versions released with a time delay, much to fans’ frustration, as has been the case of many Japanese games.

Game localization was initially an ad hoc practice that resulted in many erroneous and sometimes hilarious translations to frustrate or amuse gamers (Kohler 2005). The internet meme that reads, “All your base are belong to us,” was taken from the English version of SEGA’s *Zero Wing* (1991); it illustrates the haphazard nature of the early practice when professional translators were rarely involved. For example, early Nintendo games were commonly translated first by Japanese engineers into English, which were then edited by English native speakers (Uemura et al. 2013, 171). Unlike other fields of translation, gamers as end users were often found to be tolerant of translation quirks as long as the gameplay was not significantly hindered, as in the case of a “linguistic plot stopper" (Dietz 2006, 125). Yet, they may react extremely negatively to certain localization decisions, for example, if they are seen as oversanitizing the game through self-censorship by the publisher. In such cases, and also where there is no officially localized version, some fans may decide to take localization into their own hands through "translation hacking" as part of ROM hacking (Muñoz-Sánchez 2009; Altice 2015). This highly technical process now forms part of the so-called fan translation that is pursued as part of game fandom (O'Hagan 2018).

Self-censorship has a long history within the game industry, especially before the establishment of official age-rating systems, such as the Entertainment Software Ratings Board (ESRB) in 1994 in the case of North America. Given the user base of games included minors, it was the tacit responsibility of game publishers to address games' age suitability. Self-regulation measures applied in the early days by Nintendo of America (NoA) are particularly well known for the stringent rules regulating games to be released in North America for Nintendo consoles (O'Hagan and Mangiron 2013, 225–226). Self-censorship by game publishers during localization is alive today and remains an issue of contention among gamers whose views are now readily shared in social media. Such global avenues of communication are proving to be a two-edged sword, channeling legitimate as well as subjective opinions (O'Hagan 2018). Common factors that frequently give rise to controversy in localization range from the treatment of sexual expressions and antisocial behavior to gender issues and religious references.

The fact that games are cultural artifacts as much as technological products highlights the role of localization as a cultural filter. *Culturalization* has become a key consideration in game localization (Edwards 2012), showing the role of game localization as mediating intercultural communication, balancing any likely offense that could arise in the target market, and retaining the original flavor as something unfamiliar yet interesting in the gameplay elements. This requires specific competencies and skills on the part of localizers to be able to mediate across a complex set of sociocultural differences between the original game and its target locale. This and other technical constraints often necessitate translators' creativity to be exerted, as in the case of "transcreation" (Mangiron and O'Hagan 2006).

With the advent of social media, gamers and nongamers alike are given an unprecedented avenue to voice their views on localization, in turn generating a new ecosystem with empowered users. To translate a game is to translate the gameplay experience (O'Hagan and Mangiron 2013), and this puts game users in the central position. Yet, desirable localization may not be achieved by merely catering to every whim of users whose idea of good localization is sometimes misguided. In the age of user empowerment, professional game localizers face increasing demand to achieve optimum intercultural communication by delivering games that match as closely as possible the enjoyment experienced by gamers who played the original game. Game localization epitomizes the blurred boundary between translation and adaptation.

Minako O'Hagan

See also: Global Reach of Games

Further Reading

Altice, Nathan. *I Am Error: Nintendo Family Computer/Entertainment System Platform*. Cambridge, MA, and London: MIT Press, 2015.

Chandler, Heather, and Stephanie O'Malley Deming. *The Game Localization Handbook*. 2nd ed. Sudbury, MA, and London: Jones & Bartlett Learning, 2012.

Consalvo, Mia. *Atari to Zelda: Japan's Videogames in Global Contexts*. Cambridge, MA, and London: MIT Press, 2016.

Dietz, Frank. "Issues in Localizing Computer Games." In *Perspectives in Localization*, edited by Keiran J. Dunne, 121–134. Amsterdam and Philadelphia: John Benjamins, 2006.

Edwards, Kate. "Culturalization of Game Content." In *The Game Industry Handbook*, 2nd ed., edited by Heather Chandler and Stephanie O'Malley Deming, 19–34. Sudbury, MA, and London: Jones & Bartlett Learning, 2012.

Esselink, Bert. *A Practical Guide to Software Localization*. Rev. ed. Amsterdam and Philadelphia: John Benjamins, 2000.

Kent, Steven L. *The Ultimate History of Video Games*. New York: Three Rivers Press, 2001.

Kohler, Chris. *Power-Up: How Japanese Video Games the World an Extra Life*. Indianapolis, IN: Brady Games, 2005.

Mangiron, Carmen, and Minako O'Hagan. "Game Localisation: Unleashing Imagination with a 'Restricted Translation.'" *Journal of Specialised Translation* 6 (2006): 10–21.

Muñoz-Sánchez, Pablo. "Video Games Localization for Fans by Fans: The Case of Rom Hacking." *Journal of Internationalization and Localization* 1, no. 1 (2009): 168–185.

O'Hagan, Minako. "Game Localization: A Critical Overview and Implications for Audiovisual Translation." In *The Routledge Handbook of Audiovisual Translation*, edited by Lewis Pérez-González, 145–159. New York and London: Routledge, 2018.

O'Hagan, Minako, and Carmen Mangiron. *Game Localization: Translating for the Global Digital Entertainment Industry*. Amsterdam and Philadelphia: John Benjamins, 2013.

Uemura, M., K. Hosoi, and A. Nakamura. *Famicom and Its Era*. Tokyo, Japan: NTT Shuppan, 2013.

Wolf, Mark J. P., ed. *The Video Game Explosion: A History from PONG to PlayStation and Beyond*. Westport, CT: Greenwood Press, 2007.

Ludology

From the Latin root *ludos*, meaning "play," the term *ludology* has two meanings. The first refers to the discipline that studies play and games. The term appeared as early as 1982 (Csikszentmihalyi 1982) but seems to have gained popularity after a 1999 article by Gonzalo Frasca entitled "Ludology Meets Narratology: Similitudes and Differences between (Video)Games and Narrative." At that moment, there were multiple approaches to game and play studies from multiple disciplines, but they did not form a unified field. Now that the field is well established, it is more commonly referred to as *game studies*, even though the term *ludology* is frequently used in languages such as French and Spanish (*ludologie* and *ludología*, respectively).

The second and most frequent use of the term is for describing a school of thought that supposedly attempted to understand games by mainly focusing on their mechanics. This use of the term was common in the early 2000s within the debate known as "ludology versus narratology." Such discussions have been seen as the growing pains of a new academic discipline trying to find a space of its own within more established traditions (Aarseth 2001). However, the relationship between games, mechanics, and narrative predates this academic debate and has been part of the game design community since the early days of video games (Costikyan 1994; Crawford 1984). Although at its core it remains a valid discussion, the debate itself has lost steam in the academic world and is now seen as one of the foundational discussions of modern game studies.

Gonzalo Frasca

See also: Narrative

Further Reading

Aarseth, Espen. "Computer Game Studies, Year One." *Game Studies* 1, no. 1 (2001). Available at http://www.gamestudies.org/0101/editorial.html.

Costikyan, Greg. "I Have No Words & I Must Design." *Interactive Fantasy* 2 (1994). Available at http://www.costik.com/nowords2002.pdf.

Crawford, Chris. *The Art of Computer Game Design*. Berkeley, CA: McGraw-Hill/Osborne Media, 1984. Available at https://www.digitpress.com/library/books/book_art_of_computer_game_design.pdf.

Csikszentmihalyi, Mihaly. "Does Being Human Matter? On Some Interpretive Problems of Comparative Ludology." *Behavioral and Brain Sciences* 5 (1982): 160.

Frasca, Gonzalo. "Ludology Meets Narratology: Similitudes and Differences between (Video)Games and Narrative." Originally published in Finnish as "Ludologia kohtaa Narratologian" in *Parnasso* 3 (1999). English version available at http://www.ludology.org/articles/ludology.htm.

Ludomusicology. *See* Music

Lynx. *See* Atari Lynx

M

Machinima

Machinima is a form of digital art that uses game-based technology to create linear animations. In its most prominent form, it uses the animation technology of real-time render programs, mostly game engines, to generate animated videos. These have spread across player communities and provide important insights into game culture. These shorts can document in-game situations and gameplay but can also manifest in many other genre forms, such as music videos, comedy, action, thriller, or any other cinematic genre. Some machinima, such as Friedrich Kirschner's *The Journey* (2004), merely use games as virtual stages to develop their own narrative. In these cases, the underlying game can become unrecognizable in the service of the machinima. Others present gameplay as recorded performance, highlighting the role of the game itself.

As a typical example of digital intermedia, machinima relate to a range of relevant fields, including film, animation, puppetry, video games, sound design, and performance. Depending on how these influences are weighted in a specific machinima piece, the resulting piece can manifest as live performances, procedural animation, rendered video, or mixed media animation.

Machinima grew out of player-driven modifications as well as commercial game development. As a player-driven form of emergent play, its roots reach back into the hacker community and the evolution of the demoscene; as part of cinematic development in commercial games, it runs parallel to the improvement of in-game animation and the history of cutscenes.

Machinima's historical evolution can be broken down into different technologically defined steps. Many early arcade games showed brief clips of gameplay when running in attract mode, trying to lure customers. Some, like *Pac-Man* (1980), contained short animated sequences as intermissions between levels. Because of the limitations of the underlying technology, these were procedural animations, rendered by the game engine in real time. Following improvements in computer graphics, these animations became more complex until they became part of the gameplay itself. *Stunt Island* (1992) allowed players to stage virtual stunts, set up a number of virtual cameras to document them, and distribute the resulting stunt performance to other players. Likewise, various first-person shooting games allowed players to log their game sessions, leading to recordings of in-game performances, called *demos*. *Quake* (1996) appeared so prominently in this practice that the term *Quakemovies* was an early predecessor for the more inclusive *machinima*. Depending on the game engine, these files can contain different information regarding the recorded game state, such as player input, position of the virtual characters, or triggered animation. Because they only contain the necessary seed data to procedurally recreate the game action in the engine, demo files stay small and easy to distribute. However, the file format also remains engine specific, and a log file can only be played back in the same engine and game configuration it was recorded in. Demos, then, were recordings made by players for players. On the basis of that technology, the *Quake* clan the Rangers produced *Diary of a Camper* (1996), which is widely seen as the first successful narrative player-produced machinima. Another early technique was to record the game action directly from the screen, as seen in Miltos Manetas's *Miracle* (1996).

In parallel, the community of early game hackers developed their own version of real-time animations as self-promoting intro sequences added to games they had cracked. These intro sequences became competitive showcases of a hacker's own coding skills and evolved into increasingly elaborate animations. Celebrating effective code to generate the most extraordinary visual spectacle, the demoscene branched off into its own community with specialized festivals and competitions. Unlike Quakemovies, which relied on the underlying game engine to provide the necessary animations, rendering, and sound management, the demoscene focused on individually optimized code.

The rift between these two approaches widened at the end of the 1990s when the demo files of titles such as *Quake III: Arena* (1999) became less accessible to the player community. At the same time, screen capture techniques became available, and this significantly changed machinima production and distribution. It superseded the phase of procedural animation and demo files but made machinima more accessible to a wider audience. Captured videos could be distributed through video sharing sites and did not depend on a preinstalled game engine anymore. With the rise of streaming services, particular formats, such as gamecasts, gained popularity, blending game visualization with live game performances and blurring definitions. Videos that contain and comment on game activity spread beyond the field of machinima, blurring boundaries. Yet, machinima as a distinct practice of game art has remained active; it is showcased in festivals and critiqued and discussed in academia.

The term *machinima* emerged as a portmanteau term (machine + cinema) from an e-mail exchange between Anthony Bailey and Hugh Hancock. It was popularized through institutions such as machinima.com, the Association for Machinima Arts and Sciences, and various film festivals as well as game-specific online portals. Rooster Teeth's *Red v. Blue* machinima series (begun in 2003) is one example of the popularity of machinima. In parallel, games supported the growing community of machinima artists. Titles such as *The Sims 2* (2004) and *The Movies* (2005) featured a wide range of machinima tools. Online worlds such as *Second Life* (2003) and *World of Warcraft* (2004) spawned machinima that, in some cases, like *Leeroy Jenkins* (2005) by Pals 4 Life, became legend among the player community. The success of *Leeroy Jenkins* illustrates machinima's cross-media potential: it not only became part of *World of Warcraft* lore but was cited in other game worlds and in music, comics, and other media.

Although some machinima have become extremely famous and successful, the often restrictive end-user license agreement (EULA) regulations limit their commercial development. Derivative works based on a game developer's intellectual property often remain the property of the developer, which means that machinima artists can rarely market their work. Specific machinima engines, such as iClone, allow commercial production but lack most game functionality. Streaming services, such as Twitch, provide different legal conditions and present gameplay in their own formats.

The key difference between video games and machinima remains: games encourage play and machinima derive expression by utilizing play and play environments. Machinima remain open to experimenting with media conventions, such as Chris Burke's *This Spartan Life* series (begun 2005), combining game elements with live TV talk show settings. Machinima offer a window into video games' moving image qualities. As such, they can provide unique insights into how gamelike media reflect social conditions. This can focus on documentation of play, but it can also include social criticism, as seen in Alex Chan's *The French Democracy* (2005); artistic argumentation, as seen in Isabelle Arver's work; or activist art in the work of Joseph DeLappe. Others, such as Martin Falch's *Tales of the Past* trilogy, blend game and cinema in hybrid animations.

To achieve their desired artistic impact, machinima often bridge between different media. This most often includes references to traditional filmmaking, as seen in Robert Stoneman's *War of the Servers* (2007) and Tristan Pope's *Not Just Another Love Story* (2005), in which both artists apply narrative film techniques to game technology to comment on the in-game conditions themselves. As an independent art form, machinima has developed into a distinct art practice that reflects social realities and media development inside and outside the underlying game worlds.

Michael Nitsche

See also: Game Modifications

Further Reading

Bittanti, Matteo, and Domenico Quaranta, eds. *Gamescenes: Art in the Age of Videogames*. Monza, Italy: Johan & Levi Editore, 2009.

Kelland, Matt, Dave Morris, and Dave Lloyd. *Machinima*. Stamford, CT: Thomson Publishing, 2005.

Lowood, Henry, and Michael Nitsche, eds. *The Machinima Reader*. Cambridge, MA: MIT Press, 2011.

Marino, Paul. *3D Game-Based Filmmaking: The Art of Machinima*. Scottsdale, AZ: Paraglyph Press, 2004.

Tasajärvi, Lassi. *Demoscene. The Art of Real-Time*. Helsinki, Finland: Evenlake Studios, 2004.

Magic Circle

To give a definition of *play* in his famous book *Homo Ludens: A Study of the Play-Element in Culture* (1938), Johan Huizinga distinguished the fundamental characteristics of what he considers a special and significant form of activity with a social function. Although “all play has its rules” and “is free, is in fact freedom,” because no one is forced to play, it is “not ‘ordinary’ or ‘real’ life” but rather a stepping out of it “into a temporary sphere of activity with a disposition of its own.” Play occurs in certain limits of time and space. For Huizinga, the last limitation is more striking than the former one:

> All play moves and has its being within a play-ground marked off beforehand either materially or ideally, deliberately or as a matter of course. Just as there is no formal difference between play and ritual, so the “consecrated spot” cannot be formally distinguished from the play-ground. The arena, the card-table, the magic circle, the temple, the stage, the screen, the tennis court, the court of justice, etc., are all in form and function play-grounds, i.e., forbidden spots, isolated, hedged round, hallowed, within which special rules obtain. All are temporary worlds within the ordinary world, dedicated to the performance of an act apart. (Huizinga [1938] 1955, 10)

Of all the identified playgrounds, and certainly because it stood out from the more “ordinary” and “real” examples, the magic circle was to become an important concept in game studies. This is largely because of the place given to Huizinga’s term by Katie Salen and Eric Zimmerman in their seminal textbook on game design, *Rules of Play: Game Design Fundamentals* (2003). For Salen and Zimmerman, the magic circle becomes a “short-hand for the idea of a special place in time and space created by a game.” A “finite space with infinite possibilities,” it is especially seen as a closed circle in which the player enters and as a distinct space of meaning separated from the real world. Coupled with the idea that “there is in fact something genuinely magical that happens when a game begins,” such conception has indeed been a great way to understand video games insofar as the majority of single-player off-line games and massively multiplayer online (MMOs) games take place in a game world, be it considered fictional, virtual, or synthetic.

However, the concept has been criticized as much as it has been used because the border between the “real” world and the “magic circle” is not clear-cut. For instance, as a form of human activity, work is equally separated in time and place as play. Within our digital and ludic era, the division between *work* and *play* is even more blurred. Some people now earn their living by playing games (as professional players or as players leveling up the status of avatars for others and earning in-game currency to be sold for actual money). As Salen and Zimmerman themselves suggest, without going into the matter too closely, the magic circle might better be seen as a cognitive frame, as the player will always see and behave in games differently than in an ordinary-life psychological frame.

Bernard Perron

See also: Huizinga, Johan

Further Reading

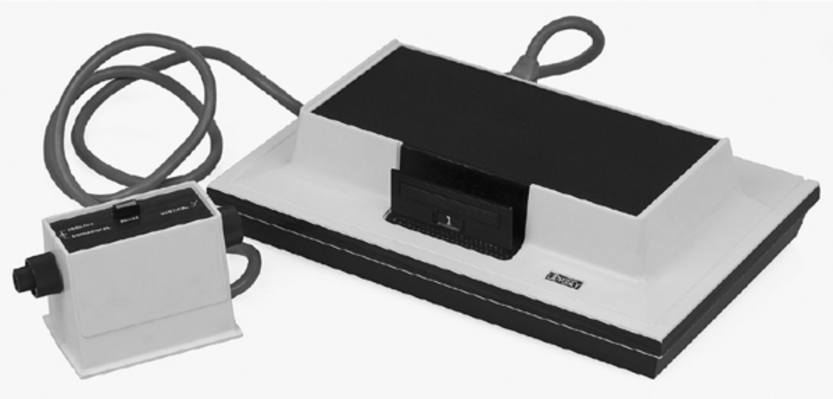
Huizinga, Johan. *Homo Ludens: A Study of the Play-Element in Culture*. Boston, MA: Beacon Press, 1955 [1938].

Salen, Katie, and Eric Zimmerman. *Rules of Play: Game Design Fundamentals*.

Cambridge, MA: MIT Press, 2003.

Magnavox Odyssey

Designed by Ralph H. Baer, who produced a series of “Brown Box” prototypes during the period 1966–68, the Magnavox Odyssey (called the Skill-O-Vision during its development) was the first home video game console and the first video game product available for consumers. It introduced a new use for existing television sets—video games—and the heavy advertising campaign used to promote it led to many preorders and success for the system, resulting in the sale of more than 130,000 units in 1972 (Winter n.d.) and the beginning of the home video game industry.



The first home video game console, the Magnavox Odyssey, was created by inventor Ralph H. Baer and appeared on the market in 1972. (Evan-Amos)

The Odyssey was a dedicated system, which means that all games were preprogrammed into the system’s hardware itself. The Odyssey’s graphics were limited to two white squares representing the players, the “ball,” and a vertical line extending across the screen. The system had no sound or on-screen scoring (players had to keep score). The Odyssey contained twelve games that were activated through the use of plug-in “carts” (short for “cartridges”), which completed different circuits when plugged in, resulting in different game variations; however, it was unlike later cartridge-based systems because all the games were hardwired in the console itself, with the plugged-in carts merely activating them. The system came with six carts used for twelve games: *States*, *Roulette*, *Haunted House*, *Analogic*, *Simon Says*, *Tennis*, *Table Tennis*, *Football*, *Hockey*, *Ski*, *Cat and Mouse*, and *Submarine*. Other optional game carts were also available for separate purchase, including *Volleyball*, *Fun Zoo*, *Handball*, *Invasion*, *Baseball*, and *Wipeout*. Another game, *Percepts*, was given free to customers who registered their Odyssey.

Because the graphics were very simple and abstract, color overlays were provided with the system, to be placed on the TV screen where they would provide a context for the action occurring on-screen. Other accessories that came with the system included playing cards, dice, and poker chips, which were used for the games. The first video game peripheral was also produced for the Odyssey, a light gun that had a photocell in its barrel that could detect the white squares on-screen (or any other light source). Four games used the light gun: *Shootout*, *Shooting Gallery*, *Prehistoric Safari*, and *Dogfight*.

The Odyssey was introduced to the public in May 1972 and initially sold for $99.95, with the light gun peripheral selling for $25; in early 1973, the price of the system was lowered to $79 (Baer 2005, 75–79). The original Odyssey continued selling until 1975, and some 350,000 Odysseys were produced and sold during that period. A number of other Odyssey models were also produced: the Odyssey 100 and the Odyssey 200 in 1975; the Odyssey 300 and the Odyssey 400 in 1976; the Odyssey 2000, Odyssey 3000, and Odyssey 4000 in 1977; and finally the Odyssey^2 in 1978. The Odyssey^2 was designed around an Intel microprocessor chipset and played advanced games, using a full QWERTY keyboard and joystick controllers. It was especially popular in Latin America and Europe. By 1978, second-generation consoles using ROM cartridges had become the industry standard, and Magnavox, primarily a television set manufacturer, was unwilling to compete with the newer generation of systems and left the industry.

The Odyssey line demonstrated the potential and demand for home video games, paving the way for all the home console systems that would follow. The idea for home video games had taken hold, and through basic game licensing and patent infringement lawsuits alone, Magnavox and Sanders were able to collect close to $100 million (Baer 2005, 88). The Odyssey also introduced video games to an international audience, as the system was exported to Mexico, Argentina, Australia, Belgium, Canada, Egypt, Germany, Great Britain, Greece, Hong Kong, Israel, Italy, Japan, Switzerland, and Venezuela. The Odyssey's international success inspired imitators and also encouraged other companies to join in the new market; for example, Nintendo entered the video game industry by distributing the Odyssey in Japan in 1974.

The Magnavox Odyssey was the start of the home video game industry and helped introduce video games all around the globe. Its games established video game conventions in genres that included ball-and-paddle games, sports games, and shooting games and made video games a part of the home environment, which proved to be their most fertile venue. Today, Odyssey games can be played on ODYEMU, an Odyssey emulator written by Paul Robson and David Winter; it is available at http://www.pong-story.com/odyemu.htm.

Mark J. P. Wolf

See also: Baer, Ralph H.

Further Reading

Baer, Ralph H. *Videogames: In the Beginning*. Springfield, NJ: Rolenta Press, 2005.

Herman, Leonard. *Phoenix: The Fall & Rise of Videogames*. 3rd ed. Springfield, NJ: Rolenta Press, 2001.

Winter, David. Odyssey pages. Accessed October 3, 2020. Available at http://www.pong-story.com/odyssey.htm.

Mainframe Games

Video games have been a major cultural and economic phenomenon since the 1970s, but their origin as a uniquely expressive cultural medium lies outside of and prior to their nascence as consumer products. However one defines a video game, it is likely that the first artifact to fit that definition appeared on a mainframe computer housed at a research lab or university. Mainframe computing, generally speaking, involves large, powerful machines that are accessed via terminals, some of which may be remote. Mainframe gaming, here defined broadly to include games for both unique computational devices like EDSAC (1949) as well as for so-called minicomputers like DEC's PDP series (begun in 1960), made it possible for early pioneers to establish video game conventions that are still visible in today's games. Before the invention of home game consoles, arcade video games, and personal computers, computer games *were* mainframe games, and gaming culture included only those who had access to these systems. Likewise, mainframe games served as an essential interface between mainstream culture and computers, fueling public imagination and inspiring cultures of hackers toward the experimentation that would lead to foundational game innovations.

Before their arrival in arcades and living rooms, video games, like all early computing applications, generally followed one of two paradigms: special purpose machines (often unique devices built simply to play the game) and computer programs that could be executed on appropriately designated "general purpose" machines. Special purpose machines included complex devices such as Nimrod (1952), which played a game of nim, and simple electronics such as Thomas Goldsmith and Estle Ray Mann's "cathode ray tube amusement device" (patented in 1948 but never mass produced; *see* "Patent #2,455,992"). General purpose machines such as the Electronic Delay Storage Automatic Calculator (EDSAC), first activated in 1949, allowed programmers to feed instructions to the processor. This distinction is important because programs written for mass-produced general purpose machines such as the PDP series had the advantage of reproducibility. In this way, programmers could easily disseminate and share their work, and, today, researchers and preservationists can emulate the function of these early games with a reasonable degree of accuracy. Obviously, clunky, fragile, single-purpose machines are more difficult to access and preserve.

MILITARY AND BUSINESS APPLICATIONS

The first tasks assigned to electronic computers were military in nature. Specifically, Britain's Colossus machines, the German Zuse Z3, and the Mark 1 at Harvard were employed by their respective national intelligence agencies toward the complex calculations required in tasks such as cryptanalysis, ballistics, and logistics. Computer scientists and engineers were also working on general mathematical problems that would prove to be foundational in game programming design. Raymond Redheffer, a mathematician working at MIT, conceived the designs for a computer that could play a game of nim as early as the mid-1940s (Redheffer 1948, 349), and a special-purpose Nimrod machine by Ferranti was first exhibited in 1951 (Donovan 2010, 6). In this way, military intelligence demands and pure mathematical research led the way for the earliest uses of computers for playing games.

As early as the mid-1950s, however, computer gaming became serious business as other applications included large-scale wargames or simulations such as *CARMONETTE* (1953) and *HUTSPIEL* (1955), developed by the Research Analysis Corporation under the domain of Operations Research (Harrison and Barrett 1964, 6). These games simulated conflicts at different scales and on different geography, and the main task for the computer (a Goodyear Electronic Differential Analyzer [GEDA]) was to store values for all units in play as well as their spatial relationships, targeting vectors, and firing doctrines (Harrison and Barrett 1964, 9). Also in the mid-1950s, the American Management Association developed the first business simulation game, *Executive Decision Making Program* (Greenlaw 1962, 15). Military and business applications for computer-based gaming grew rapidly in the late 1950s, with dozens of games in place by the early 1960s (Greenlaw 1962). Other significant developments in this arena included the *Naval Electronic Warfare Simulator* (NEWS) as well as several projects by the RAND Corporation (Harrison and Barrett 1964, 20).

Today, the most well-known computer game of the 1950s is perhaps *OXO* (1952), a tic-tac-toe game Alexander Douglas programmed for the EDSAC (Donovan 2010, 6). This game is historically significant for being experimental as well as entertaining. Moreover, the three-by-three game grid is displayed electronically on the machine's CRT monitor, a component that would normally be used to observe the progress of a program as it executed (Campbell-Kelly 1980, 7). Players input their moves through a rotary phone dial and received instructions and other output through a teleprinter, but the theoretical magic circle of the game space coincides with the EDSAC graphical display. Other games quickly followed, including Claude Shannon's design of a computer for playing Hex (Ahl 2007, 31), and information theorist Arthur Samuel's program for checkers that would actually learn better strategy as it played (Montfort 2005, 78; Ahl 2007, 31). In 1956, engineers at the University of Michigan produced a pool simulation on their MIDSAC. This game generated imagery for the pool table, balls, and a cue stick on a CRT monitor, and when players took shots, the computer calculated the movement of the balls in real time (Goode, Pollmar, and Wright 1956, 15).

Thus far, the few existing computer games and their predecessors were limited in scope and accessibility and thus had little influence beyond their specific fields or institutions. Game programs of chess, checkers, Hex, and nim were valuable for their proof of mathematical or logical processes and were accordingly of mainly academic interest. Likewise, wargames and business games were of value for modeling very specific processes and were, to some extent, developed in secret (Ahl 2007, 32). However, at least one device in the late 1950s gave the general public a glimpse of the future of video games.

Tennis for Two (1958) was an installation created by William Higinbotham and Dave Potter at the Brookhaven National Laboratory that required two players who interacted by rotating a knob attached to a potentiometer that adjusted the position of an imaginary tennis racket. Pressing an adjacent button signified a hit and, hopefully, returned the ball over the net. The logic circuitry used was relatively simple, consisting of electronic relays, resistors, and capacitors, and a five-inch oscilloscope used as a display. Although it was disassembled shortly after its demonstration and was not as directly influential on later games, the fact that Higinbotham created *Tennis for Two* to provide an easily accessible and entertaining demonstration of computers for a purpose that was not scientific, military, or economical is symbolic of how many early games would soon develop—as side projects or hacks devised during downtime when the real computer work was not being done.

THE ARRIVAL OF *SPACEWAR!*

Spacewar!, completed in 1962 by a team of MIT students, was a game made as a hack. Not only was *Spacewar!* significant for creating a compelling interactive experience powered by a computer, but it was also the first game to convey a completely fictional space. The game itself pitted players against one another in an outer space milieu loosely inspired by the *Lensman* series of novels (Graetz 2001, 42), and it was significant not only for its innovation but also because of its portability. The programming for *Spacewar!* was written in PDP-1 assembly, so it was easy to reproduce on the PDP machines and was played at many research institutions, which is how it came to inspire *Galaxy Game* (1971), the first coin-operated video game, and Nolan Bushnell's *Computer Space* (1971; Herman 1994, 11).

Although *Spacewar!* and the games it inspired were developed by hobbyists, cutting-edge academic research, conducted on mainframe systems, also led to significant advancements in computer gaming in the 1960s. *ELIZA* (1964) was a LISP program engineered on MIT's MAC system by Joseph Weizenbaum with one component, *DOCTOR*, intended to imitate the interaction between a psychiatric patient and a therapist (Weizenbaum 1966, 36). Using simple language parsing, *DOCTOR* appears to respond appropriately to player input as the player tells the doctor about his or her problems. The trick, as one quickly finds, is that *ELIZA* simply takes key phrases from the input and poses them as follow-up questions. In this way, *ELIZA/DOCTOR* has been described as a parody of Rogerian therapy (Humphrys 2009, 238), but the effect is compelling enough that its programming and behavior is a direct ancestor of modern chatterbot systems. *SHRDLU* (written 1968–70), a natural language processing system completed a few years later by Terry Winograd, advanced language parsing even further.

Computer Space may have been inspired by *Spacewar!*, but its design and construction created a somewhat different game. *Galaxy Game*'s relationship to *Spacewar!* is quite clear, however, as it was a straightforward adaptation of *Spacewar!* that was designed to run with up to eight players accessing consoles powered by a PDP-11/20 minicomputer. Unlike *Computer Space*, the first mass-produced coin-op game, *Galaxy Game*, was a unique device that was installed at

Stanford's Tresidder Union in 1971, where it remained in operation until 1979. Programmer Bill Pitts and engineer Hugh Tuck never mass-produced their game, mainly because the cost of the equipment ran to $20,000 (Pitts 1997).

PLATO AND OTHER SYSTEMS

In the 1970s, while the arcade industry exploded and the home console industry went through its first two generations, a different culture of video gaming thrived on the mainframe systems now proliferating in universities and corporate research centers. The first version of PLATO (Programmed Logic for Automated Teaching Operations) came online in the early 1960s as a means for using computer technology to assist in education. PLATO's engineers, led by Don Bitzer at the University of Illinois, did conceive of games as one part of its pedagogical mission (Bitzer 1973, 177), but it was not until the improved plasma displays, graphics, and connection speed of PLATO IV that interactive gaming became viable (Umpleby 1971, 7). Users interacted with PLATO and, ultimately, one another by typing at a terminal that sent and received input and output between the user and a mainframe computer (originally ILLIAC and, later, systems in the CDC Cyber series) some distance away.

For PLATO IV, those advancements arguably hosted the first online community, which in turn saw the first instances of later computing practices such as instant messaging and message boards. Although games were occasionally part of the "courseware" developed for PLATO, real innovation in gaming came from students and hobbyists, who produced the first multiplayer video games and computer role-playing games (RPGs). By the late 1970s, the game index for the CDC version of PLATO included more than one hundred entries (Denenberg 1978, 2), but chief among these games were the early iterations of game genres that would come to dominate video gaming. Games such as *PEDIT5* (1975), *DND* (1975), *Oubliette* (1977), *Moria* (1975; which employed a first-person maze inspired by the earlier Imlac PDS-1 game *Maze War* [1974]), and *Avatar* (1979) were all popular RPGs (Barton 2008, 32). *Empire* (1973) and *Spasim* (1974) offered combat in space, and *Panther* (1975) featured a first-person view of a tank battle with vector graphics. All told, gaming accounted for about 20 percent of PLATO use from 1978 to 1985 (Woolley 1994).

PLATO was not the only computer system or community in the 1970s. A similar pedagogical aim for computing motivated Don Rawitsch in 1971 to develop *The Oregon Trail* (at first, entirely text based) on an HP Timesharing Basic machine, later distributing it via the Minnesota Educational Computing Consortium (MECC; Coventry 2007). The growing user base of DEC PDP machines, along with the development of higher-level programming languages such as FORTRAN and BASIC, led to many new games and game genres. The *Star Trek* television series proved a popular source for many game adaptations, most notably Dan Daglow's *Star Trek* (1972) for the PDP-10; Mike Mayfield's *Star Trek* (1972) for the HP2000C (later rewritten by David Ahl in BASIC as *Super Star Trek* [1978]); *Empire* (1973) for PLATO; William Char's *TREK73* (1973); and Daglow's eighteen-player *DECWAR* (1978) for the PDP-10. Daglow was also responsible for *Baseball* (1971), the first baseball computer game, which was also programmed for a PDP-10 (Maragos 2004).

The BASIC (Beginner's All-purpose Symbolic Instruction Code) programming language and its community of authors were an important early gaming culture that centered around organizations such as People's Computer Company and publications such as *Creative Computing*, which fostered an ethic of sharing code. Thus, when Gregory Yob sought to improve the gameplay of early text-based grid games such as *Hurkle*, *Snark*, and *Mugwump*, he could produce the more complex dodecahedron-based *Hunt the Wumpus* in 1972 (Yob 1976, 247). *Hunt the Wumpus* and similar games used a basic text parser in which users entered basic commands to move their character through a series of rooms toward an objective. This interface would see a much more elaborate implementation in Will Crowther's *ADVENT* (or *Colossal Cave Adventure*), which Crowther developed in 1976 using FORTRAN on a PDP-10. After Crowther made the game available via the internet, Don Woods improved the code and added some features that would characterize the eponymous adventure game genre, of which the most well-known title is likely *Zork* (1977), which also began as a mainframe game.

David Lebling, who had worked on *Maze War*, along with Tim Anderson, Marc Blank, and Bruce Daniels, created *Zork* on a PDP-10 after being inspired by the gameplay of *ADVENT* and the sense of spatial immersion of *Maze War* (Montfort 2005, 97). *Zork* eventually proved to be immensely popular in the burgeoning personal computer market, and it also directly inspired Roy Trubshaw's *MUD* (*Multi-User Dungeon* [1978])—the ancestor of modern massively multiplayer online role-playing games (MMORPGs) and arguably the first virtual world platform to become widely popular—which he first began working on with a PDP-10 mainframe (Bartle 2003, 3-4).

Through the 1980s, mainframe computing remained an important aspect of video game production, even as arcade games, console games, and personal computers rapidly expanded the user base for video games. Still, some games that would become popular on other platforms first saw life on mainframes. For example, Alexey Pajitnov first created *Tetris* (1985) on an Electronika 60, a clone of the PDP-11 (Donovan 2010, 200). Mainframe gaming may no longer have a place in mainstream gaming culture, but the significance of mainframe computing is hard to overstate. Mainframe computers were not only the first platforms available for gaming, but their characteristics and affordances also gave shape to generic game aesthetics that remain relevant in modern game genres.

Some authors have noted that the military and industrial primary applications for computing enabled gaming to develop in the wake of the "military-academic-industrial complex," but it is surely significant that communities of gamers and game developers frequently adopted postures of openness and sharing that stand in contrast to the secrecy and brinkmanship of military and industrial computing during the Cold War (Dyer-Witheford and de Peuter 2009, 7). At the same time, as Stuart Umpleby wrote in 1971, "Role-playing games . . . could become an important tool in the democratic operation of a technologically complex society" (20). In other words, if mainframe games are a side effect of the Cold War, video games, especially those produced in the margins of mainstream gaming, could also help us look forward to a better future.

Zach Whalen

See also: *Spacewar!*

Further Reading

Ahl, David H. "Mainframe Games and Simulations." In *The Video Game Explosion: A History from PONG to PlayStation and Beyond*, edited by Mark J. P. Wolf, 31–34. Westport, CT: Greenwood Press, 2007.

Bartle, Richard A. *Designing Virtual Worlds*. Indianapolis, IN: New Riders, 2003.

Barton, Matt. *Dungeons and Desktops: The History of Computer Role-Playing Games*. Wellesley, MA: A. K. Peters, 2008.

Bitzer, Donald L. "Computer Assisted Education." *Theory into Practice* 12, no. 3 (1973): 173–178.

Campbell-Kelly, Martin. "Programming the EDSAC: Early Programming Activity at the University of Cambridge." *Annals of the History of Computing* 2, no. 1 (1980): 7–35.

Coventry, Joshua. "Educational Computing for the Masses." *SiliconUser*, June 28, 2007. Available at https://lowendmac.com/2014/mecc-educational-computing-for-the-masses/.

Denenberg, Stewart A. "A Personal Evaluation of the PLATO System." *SIGCUE Outlook* 12, no. 2 (1978): 3–10.

Donovan, Tristan. *Replay: The History of Video Games*. East Sussex, UK: Yellow Ant Media, 2010.

Dyer-Witheford, Nick, and Greg de Peuter. *Games of Empire: Global Capitalism and Video Games*. Minneapolis: University of Minnesota Press, 2009.

Goode, Harry Herbert, Carl H. Pollmar, and Jesse B. Wright. "The Use of a Digital Computer to Model a Signalized Intersection." Paper presented at the National Academy of Sciences, Washington, DC, January 1956. Available at http://hdl.handle.net/2027.42/5171.

Graetz, J. M. "The Origin of Spacewar!" In *Supercade! A Visual History of the Videogame Age, 1971–1984*, edited by Van Burnham. Cambridge, MA: MIT Press, 2001.

Greenlaw, Paul. *Business Simulation in Industrial and University Education*. Englewood Cliffs, NJ: Prentice-Hall, 1962.

Harrison, Joseph, and Mary Frances Barrett. *Computer-Aided Information Systems for Gaming*. 1964. Available at https://apps.dtic.mil/dtic/tr/fulltext/u2/623091.pdf.

Herman, Leonard. *Phoenix: The Fall & Rise of Home Videogames*. Springfield, NJ: Rolenta Press, 1994.

Humphrys, Mark. "How My Program Passed the Turing Test." In *Parsing the Turing Test*, edited by Robert Epstein, Gary Roberts, and Grace Beber, 237–260. Dordrecht, Netherlands: Springer, 2009.

Maragos, Nich. "Talking: Dan Daglow." 1up.com, July 26, 2004. Available at https://web.archive.org/web/20041220115548/http://www.1up.com/do/feature?cId=3120265&did=1.

Montfort, Nick. *Twisty Little Passages: An Approach to Interactive Fiction*. Cambridge, MA: MIT Press, 2005.

Pitts, Bill. "The Galaxy Game." *Stanford Computer History Exhibits*, October 29, 1997. Available at http://infolab.stanford.edu/pub/voy/museum/galaxy.html.

Redheffer, Raymond. "A Machine for Playing the Game Nim." *American Mathematical Monthly* 55, no. 6 (1948): 343–349.

Umpleby, Stuart. "The Teaching Computer as a Gaming Laboratory." *Simulation & Gaming* 2, no. 1 (1971): 5–25.

Weizenbaum, Joseph. "ELIZA—A Computer Program for the Study of Natural Language Communication between Man and Machine." *Communications of the ACM* 9, no. 1 (1966): 36–45.

Woolley, David R. "PLATO: The Emergence of Online Community." Thinkofit, 1994. Available at http://thinkofit.com/plato/dwplato.htm.

Yob, Gregory. "Hunt the Wumpus." In *The Best of Creative Computing*, edited by David H. Ahl, 247–250. Morris Plains, NJ: Creative Computing Press, 1976.

MAME

The MAME project (which originally stood for Multiple Arcade Machine Emulator) is an emulator application initially aimed to emulate arcade games. In 2015, the MAME project absorbed the Multi Emulator Super System (MESS) and now emulates computer systems, game consoles, and calculators. MAME's official website states that it is a nonprofit organization with two main purposes: education and preservation. MAME is particularly useful for the study of arcade games and rare computer systems, many of which are now difficult to find or no longer exist at all.

The first version of the MAME software was developed by Nicola Salmoria in 1996. By 1997, the application supported 346 games, but by 2019, and with the inclusion of MESS in the project, there were thirty-two thousand unique systems emulated. MAME was originally developed for DOS but is now mainly developed for Windows and ported for other platforms. It is a free, open-source project, which means that the code is theoretically accessible to every user who wants to work with it. Its license, however, still restricts any commercial usage of the code and the emulation of games. The philosophy behind MAME is to give access to games without encouraging piracy, which means that it discourages competing with the arcade games still being sold, and the license makes sure that this line of thought is respected. Furthermore, because each game is unique, new versions of the software can change in such a way that previously supported games are not supported anymore.

The goal of the MAME project is the reverse engineering of system architectures, often when documentation to build them back is unavailable. Therefore, it favors low-level emulation, which is the emulation of smaller parts of the process; as a last resort, high-level emulation can be used. This makes the system requirements for emulating with MAME very high. The software is not necessarily meant to be user-friendly; the files (BIOS set, ROM set, device set, etc.) and their configuration needed to emulate a specific machine or game is not easy to use for the common user. However, MAME can be used with front-end applications, which offer a more user-friendly interface for the loading of games.

Not every game or system is easily and legally available. Some games are willingly distributed by the owner of the copyright on the application's or game developers' websites within a noncommercial license, but for most of the games, the read-only memory (ROM) and basic input/output system (BIOS) parts are under copyright. The MAME website suggests creating ROM files directly from original printed circuit boards with a hardware ROM reader.

Even though playing the games is necessary to test the emulation success or failure, it is only considered a nice side effect of the MAME project and is not its main goal. According to this line of thought, new features permitted by the newer operating systems, such as playing multiplayer games online or modifications to make games easier to use, are not implemented in the official versions and are discouraged by the main team for third-party developers.

The preservation aspect of the MAME project aims at the software itself; external devices and the original context of gaming are not included. However, fans and amateur archive curators build homemade MAME cabinets to recreate the original gaming interfaces, with joysticks and buttons. Although museums and galleries have made some effort to preserve arcade cabinets and games, it is often not easy for the common user to access them. Even for game historians and researchers, MAME is often the only way to play certain arcade games.

Simon Dor

See also: Arcade Games

Further Reading

Multiple Arcade Machine Emulator (MAME) website. Accessed October 3, 2020. Available at http://mamedev.org.

Manuals. *See* Game Manuals

Maps

Even though maps in computer games are important and sometimes crucial for playing, they are hardly recognized by game theory. Just as in everyday life, maps offer a different perspective on a world, albeit a virtual one. However, developments in navigation systems and application tools that use graphical and navigational conventions established by video game maps demonstrate that such maps were forerunners of the systems mapping real-world spaces.

Maps are related to video games in at least four ways. First, maps can appear within a game, either diegetically as part of the world of the game or nondiegetically as a help screen or display (Gazzard 2013, 82), or as a physical object included with the game; either way, they help the player visualize the game's space. Therefore, their size can vary; they could appear as an insert within the screen, an overlay, or a full screen.

Second, a map is an equivalent to a level of a game that is mostly used by players to address a certain ground on which they fight each other in the multiplayer mode (such as in games like *Counter-Strike* [1999]). Thus, to consider this playground literally as a “map” is closely related to the design of games in which the spatial structure is based on a two-dimensional construction. From this perspective, the overhead view of the map and the player’s first-person perspective view are simply different renderings of the same data.

Third, a map of a game also exists as a cognitive “mental map” of the game space that can literally be reproduced by players in physical form, either on paper, as used to be the case in text-based adventure games (some later adventure games included maps in their packaging, such as *Ultima IV: The Quest for the Avatar* [1983] and *The Elder Scrolls III: Morrowind* [2002]), or in digital form, as is the case with many massively multiplayer online role-playing games (MMORPGs) today, where special-purpose maps are used by the players to communicate their spatial knowledge.

Fourth, a map can appear as an introduction to the game: maps can provide a narrative context, as is the case in alternate history games, in which a scenario in the near future or in an alternative past or present is envisaged against the background of an existing geopolitical situation (Günzel 2007). Different versions of maps can also coexist in games, as in *Tom Clancy’s Ghost Recon* (2001), in which, in addition to a general introductory map to the historical context and a specific introductory map to the actual game space, there is an optional on-screen map that could even be considered a diegetic map if the player does not identify himself or herself with one of the soldiers but with the squad leader.

A starting point for analyzing maps in video games is their structure, appearance, and usability. The function of a map depends on the resolution of the map: maps of lower resolution give players a rough estimate of where they are in the overall space of the game, that is, how an avatar or character is situated within the game world and where in relation to that location relevant objects or events can be found. Such maps are often constantly present like a heads-up display near the edge of the screen, and many are made to resemble a radar screen, the earliest examples appearing in *Battlezone* (1980) and *Defender* (1980). Maps not only orient a player and highlight the location of in-game objects and enemies but sometimes also allow active navigation within the map. (This is again the case in *Ghost Recon*, in which the user can switch to the map mode and practically control the game completely on the map.) *Stellar Track* (1981) for the Atari 2600 was played entirely with maps and information screens, both of which represented all the action of the game. Short-range scanners gave a map of the immediate sector, including ship positions, whereas long-range scanners gave a map of the entire quadrant; both could be destroyed by enemy fire, requiring the player to move and fire from memory.

A mixture of these two scales of maps are the so-called automaps that can be found in early three-dimensional shooting games such as *DOOM* (1993) or *Descent* (1995; in which the map itself is three dimensional). Such a map “automatically” adds to the map those parts of the game space that have been encountered, thereby revealing the space of a game bit by bit or room by room. (Although, with the right cheat, the full territory can be displayed.) In *DOOM*, navigation by the map alone is possible, but it is hindered by two obstacles. First, control is not adapted to the top-down view; pressing the button for "up" does not result in a movement "north" but rather in the direction the character is facing. Second, unlike most radar minimaps, enemies are not displayed. The design tendency in respect to maps of the second kind is to show them as overlays, allowing players to see both renderings of the game space in the same size but with a different scale (as in *Diablo* [1997]). In more recent games, the map is presented as an augmentation in diegetic space (as is the case in *Dead Space* [2008], where, similar to *Descent*, the map is three dimensional). The map is thereby ontologically on the same level as in-game orientation signs, such as markings for pathways or direction indicators. These have appeared in video games since the late 1990s, as in *Counter-Strike* (1999) and *Call of Duty* (2003), in which the indicators for hits on the player character show not only an injury but also the direction from which it came, in the form of a compass that is not oriented to an absolute direction (e.g., north) but to a relative one (the enemy in relation to the player character's standpoint).

Video game maps as well as other forms of game spaces are a relevant topic to the study of media in both semiotic and pictorial respects because the criteria for a depiction to be considered a map or a representation of space cannot be derived from the *style* of the image only: an indicator of a hit can thus be (part of) a map, just like a pure plane depiction of game space (as in virtually all two-dimensional games) is not necessarily a map. Semiotically, maps in video games question the understanding of "representation," insofar as any depiction of a game space can be called a representation of space (Wolf 1997) or its allegory (Aarseth 2001). Thus, the specificity of a map derives from its *function*, which mainly is that of orientation and navigation and not that of actual action. In consequence, the main screen in simulation games such as *SimCity* (1989) is not a map, even though the space is seen in a simplified overhead view. In fact, *SimCity* has an additional on-screen representation of the overhead view of space in the upper part of the image, which serves the purpose of orientation, making this part of the picture a map and a representation of the game space itself.

Hence, in general, maps can be addressed as "second spaces" in accordance to Edward Soja's (1996) reading of Henri Lefebvre's (1991) trialectic of space: they are representations of a perceivable space that reciprocally constitute the totality of experienced space, in Lefebvre's terms, "lived" space. This "third space" is a "representational space" (not only a representation of space), as it is experienced by many users who share the same space already without being present there at the same time (Günzel 2019). This experience is not only limited to persistent worlds but is also present in single-player games, as different users experience the same map.

Stephan Günzel

See also: Space (Narrative); Space (Visual)

Further Reading

Aarseth, Espen. "Allegories of Space. The Question of Spatiality in Computer Games." In *Cybertext Yearbook 2000*, edited by Markku Eskelinen and Raine Koskimaa, 152–171. Jyväskylä, Finland: University of Jyväskylä, 2001.

Gazzard, Alison. *Mazes in Videogames: Meaning, Metaphor and Design*. Jefferson, NC: McFarland & Co., 2013.

Günzel, Stephan. "Eastern Europe, 2008: Geopolitics in the Video Game." In *Space Time Play: Games, Architecture, and Urbanism—The Next Level*, edited by Friedrich von Borries, Steffen P. Walz, and Matthias Böttger, 444–449. Basel, Switzerland; Boston, Massachusetts; and Berlin, Germany: Birkhäuser, 2007.

Günzel, Stephan. "What Do They Represent?: Computer Games as Spatial Concepts." In *Ludotopia: Spaces, Places and Territories in Computer Games*, edited by Espen Aarseth and Stephan Günzel, 98–112. Bielefeld, Germany: Transcript, 2019.

King, Geoff, and Tanya Krzywinska. *Tomb Raiders and Space Invaders: Videogame Forms and Contexts*. New York: I. B. Tauris, 2006.

Lefebvre, Henri. *The Production of Space*. Translated by Donald Nicholson-Smith. Malden, MA: Blackwell, 1991 [1974].

Nitsche, Michael. *Video Game Spaces: Image, Play, and Structure in 3D Worlds*. Cambridge, MA: MIT Press, 2009.

Soja, Edward. *Thirdspace: Journeys to Los Angeles and Other Real-and-Imagined Places*. Hoboken, NJ: Wiley-Blackwell, 1996.

Wolf, Mark J. P. "Inventing Space: Towards a Taxonomy of On- and Off-Screen Space in Video Games." *Film Quarterly* 51 (1997): 11–23.

Mario Kart Series

The *Mario Kart* series of racing games is centered on the setting and characters from Nintendo's *Mario* franchise. First released in 1992 for the Super Nintendo Entertainment System (SNES), *Mario Kart* has been a staple release for nearly every Nintendo platform since and with a gradually expanding cast of playable characters. *Mario Kart* is known for its colorful cast of playable characters and racing tracks along with its skillful yet frenetic gameplay. A key gameplay mechanic underpinning *Mario Kart*'s appeal is players' use of *power-ups* or *items*, such as mushrooms, turtle shells, and banana peels, that introduce an unpredictable and combative element to the racing genre. In this entry, the game design philosophy underpinning *Mario Kart*'s "karting" subgenre is explored alongside the franchise's continued commercial influence in the games industry.

When *Mario Kart* was first released as *Super Mario Kart* (1992) for the SNES, it was an extraordinarily successful commercial hit for Nintendo, with the title selling 8.7 million copies (making it the fourth best-selling SNES title). *Super Mario Kart* was acclaimed for its pioneering role in creating the subgenre of karting racing games, with titles such as SEGA's *Sonic Drift* (1994), Rare's *Diddy Kong Racing* (1997), Naughty Dog's *Crash Team Racing* (1999), and future installments of *Mario Kart* all drawing inspiration from *Super Mario Kart*'s design. Fundamental to *Super Mario Kart*'s design was its diverse set of racing tracks, including "Choco Island" and "Rainbow Road," and players' use of power-ups and items—elements of game design that will be returned to later in this entry. However, another crucial element of *Super Mario Kart*'s success that is impossible to ignore and that has had a significant influence on the games industry since is its setting in the intellectual property of the *Mario* franchise.

***Super Mario Kart* racing at the City Amusements video game arcade located on Level 3 in the Market City Shopping Centre in Sydney, Australia. (Bundit Minramun/Dreamstime.com)**

For many years prior to *Super Mario Kart*, *Mario* characters had appeared in other genres of games outside of platformers, including the sports games *Tennis* (1984) and *Golf* (1984), in which the in-game avatars closely resemble Mario; Nintendo's 1991 SNES version of Maxis's simulation game *SimCity* (1989), where Bowser appears as a Godzilla-like monster; and puzzle games such as *Dr. Mario* (1990). Unlike these previous examples, *Super Mario Kart* relied directly on the aesthetic established by *Mario* (particularly *Super Mario World* [1990]), and its commercial and critical success quickly awakened Nintendo to the potential for utilizing its intellectual property in entirely new genres. The creative use of existing intellectual property would be instrumental in subsequent Nintendo franchises, such as *Mario Party* (1998–present) and *Super Smash Bros.* (1999–present). Indeed, as the success of *Super Smash Bros.*' diverse set of in-game characters from across different genres and franchises exemplifies, game design does not need to be limited to a single intellectual property.

The trend toward games (especially multiplayer games) borrowing from different intellectual properties can be seen in *Mario Kart*'s latter design with *Mario Kart 8* (2014), which includes the character Link from *The Legend of Zelda* franchise. Link appears in *Mario Kart 8* as a paid-for downloadable character, and it is this model of continuous monetization that has become normalized across the games industry (Alha et al. 2014). It is beyond the scope of this entry to critically consider the amalgamation of intellectual properties present across game genres, but it is easy to be reminded of James Newman's (2002, 46) nonrepresentational perspective regarding the way in-game avatars are experienced primarily as playful "potentialities and capabilities." Moreover, as Boluk and LeMieux (2017) have noted via the work of Shaviro (2003), these "mashup" games are emblematic of a wider societal experience of "brand names, corporate logos, and simulacra" (Boluk and LeMieux 2017, 187). The role of *Super Mario Kart* and subsequent karting games in pioneering this more malleable state of a game's setting, characters, and diegesis is significant. Importantly, though, the mashup philosophy of game design is mirrored in *Mario Kart*'s gameplay.

As previously mentioned, *Mario Kart* involves a distinctive mix of skill-based gameplay with more frenetic and unpredictable elements. *Mario Kart* has always been associated with sensitive controls, including players' ability to jump, use items, and create mini boosts through "drifting." In the example of drifting, the masterful way *Mario Kart* can be played is exemplified by the mechanic involving players rapidly inputting left and right on the D-pad, control stick, or motion control device. In the context of a high-speed hazardous race (many tracks in *Mario Kart* involve no side railings and punish players for falling off), inputting left and right while maintaining balance on the track requires practice and dedication. For the most devoted *Mario Kart* players, mechanics such as drifting are taken to extremes to record ever faster times, and titles such as *Mario Kart 64* (1996) have attracted a thriving community of speedrunners. However, *Mario Kart* also defies its competitive status with the inclusion of what Marc LeBlanc would call "dramatic" elements of game design aimed at leveling the outcome of the game for every player. The most famous and controversial example of this dramatic design being the "spiny" item, widely known as a "blue shell."

First introduced in *Mario Kart 64*, blue shells specifically target the player leading the race, who has few to no counterplay options available to dodge an incoming blue shell. Once the blue shell hits its target, every other player has an opportunity to take the lead, until the process of using a blue shell repeats itself, typically with "dramatic" consequences for the outcome of the race. As Ian Bogost (2014) noted when criticizing the philosophical implications of *Mario Kart's* blue shell, it is "a hazard that strips certainty and authority from the player. . . . Spiny Shells are chaos, unfairness, injustice."

However, it is this mixture of skill-based and unpredictable design that makes *Mario Kart* and similar karting games so widely appealing. For other Nintendo franchises inspired by the *Mario Kart* model of hybrid game design, such as the aforementioned *Mario Party* or *Super Smash Bros.*, similar combinations of skillful yet unpredictable gameplay can be noted. For *Mario Kart*, though, it is this mix of aesthetic, diegetic, and playful elements that is constitutive of the franchise's varied yet distinctive experience.

Joshua Jarrett

See also: *Mario* Series; Nintendo

Further Reading

Alha, K., E. Koskinen, J. Paavilainen, J. Hamari, and J. Kinnunen. "Free-to-Play Games: Professionals' Perspectives." *Proceedings of Nordic DiGRA 2014*. 2014.

Available at http://www.digra.org/wp-content/uploads/digital-library/nordicdigra2014_submission_8.pdf.

Bogost, Ian. "The Blue Shell and Its Discontents." Gamasutra, May 30, 2014. Available at http://www.gamasutra.com/view/feature/218696/the_blue_shell_and_its_discontents.php.

Boluk, S., and P. LeMieux. *Metagaming: Playing, Competing, Spectating, Cheating, Trading, Making and Breaking Videogames*. Minneapolis: University of Minnesota Press, 2017.

Gach, E. "The Race to Stop the Best Mario Kart 64 Player from Securing Every World Record." Kotaku, May 15, 2018. Available at https://kotaku.com/the-race-to-stop-the-best-mario-kart-64-player-from-sec-1826048444.

LeBlanc, M. "Tools for Creating Dramatic Game Dynamics." In *The Game Design Reader: A Rules of Play Anthology*, edited by Katie Salen and Eric Zimmerman, 438–460. Cambridge, MA: MIT Press, 2006.

Newman, J. "In Search of the Videogame Player: The Lives of Mario." *New Media and Society* (2002): 405–422.

Shaviro, S. *Connected, or, What It Means to Live in a Network Society*. Minneapolis: University of Minnesota Press, 2003.

Mario Series

Nintendo's mascot, the Italian plumber Mario, is a video game icon. As of 2019, Wikipedia lists over 250 games featuring Mario, many sources state he has starred in at least four of the top ten best-selling games of all time, and, in 2015, Nintendo announced that the core *Super Mario Bros*. games had sold more than 310 million copies (Nintendo 2015).

Created by Shigeru Miyamoto, Mario first appeared in the arcade game *Donkey Kong* (1981). At the time, Nintendo was struggling in the United States, and its arcade game *Radar Scope* (1980) had flopped. This failure led Nintendo of America's president, Minoru Arakawa, to ask Nintendo of Japan to develop a new game that would use the hardware from the two thousand unsold *Radar Scope* machines so that Nintendo of America could make back some money from the game (Sheff 1993).

The task of making the new game fell to first-time game designer Shigeru Miyamoto. According to an interview on the Nintendo website, Miyamoto originally started to create a Popeye-themed game. At the time, Nintendo had a license to produce playing cards featuring Popeye, Brutus, and Olive Oyl, but shortly after Miyamoto began to create the game, it was determined that Nintendo was unable to use those characters (Sheff 1993). Rather than start over, Miyamoto created the characters that would go on to be known as Mario, Donkey Kong, and Pauline.

In the early days, however, the main character was not named Mario; he was first known as Mr. Video and then Jumpman (Iwata 2009). The Jumpman name was rejected by Arakawa, who did not think the name would appeal to Americans. In the end, Nintendo of America chose the name Mario because they thought the character looked like their landlord, Mario Segale (NPR Staff 2015).

Just as Mario's name and existence are due to accidents and coincidences so too is his iconic mustache, hat, overalls, and gloves. Miyamoto said that in the original *Donkey Kong* arcade machine, the Mario character could only be sixteen pixels wide and sixteen pixels tall (Iwata 2009). At that small size it was not possible to give Mario a mouth, so he was given a moustache to give his face some distinct features. Similarly, he was given a hat so they did not need to animate hair, and, finally, he was given overalls to make his arms a different color from his body and gloves to make his hands visible (Iwata 2009).

After appearing as the hero in *Donkey Kong* and the villain in *Donkey Kong Jr.* (1982), Mario then appeared in the arcade game *Mario Bros.* (1983), which introduced both his brother Luigi as well as the green pipes that would become synonymous with Mario's iconography (McLaughlin 2007). His next game, *Super Mario Bros*. (1985) for the Nintendo Entertainment System (NES), would go on to introduce many of the plot elements that have become the basis for nearly all the *Mario* games since and make Mario world famous: running from left to right, jumping on enemies, smashing bricks, leaping over bottomless chasms, finding secrets and gold coins, eating mushrooms that made him larger, and finding flowers that allowed him to throw fireballs.

Super Mario Bros. was released in Japan on September 13, 1985, and in the United States in limited numbers on October 1985, with a wider release in 1986 (Cifaldi 2012). The game would go on to sell more than forty million copies and helped to revive the video game industry, which was struggling to recover from the crash of 1983 (Cifaldi 2012).

With the success of *Super Mario Bros*. a sequel was inevitable, but Miyamoto was busy working on the first *Zelda* game, so *Super Mario Bros. 2* (1988) was created with minimal input from him (McLaughlin 2007). The result was a game that was so difficult that it was not released outside of Japan until 1993, when it was included in the Super Nintendo Entertainment System (SNES) game *Super Mario All-Stars* (1993). Faced with a game they thought too difficult for the United States, and not wanting to release nothing and risk losing the mania for Mario, Nintendo took *Yume Kōjō: Doki Doki Panic* (1997), a game that Miyamoto had worked on, and replaced its characters with *Mario*-themed characters (McLaughlin 2007). This game was originally created to help promote a Fuji Television event; it had many similarities to *Super Mario Bros.*—including a theme composed by Koji Kondo, stars, coins, and level warping—and a similar style of play, but it also had many differences, including no secrets, no stomping enemies, and none of the turtle-like enemies of the first game.

Super Mario Bros. 3 (1990) featured the return of Miyamoto's guidance and sold more than seven million copies in the United States upon its release (Sheff 1993). This marked the last appearance of a *Super Mario* game on the NES. Just as the NES included *Super Mario Bros.* when it launched in the United States, the SNES included its own *Mario* game, *Super Mario World* (1990), when that system was launched in the United States in the fall of 1991. This trend of launching a new Nintendo console with a new *Mario* game continued in the fall of 1996 with the release of the Nintendo 64, which came bundled with *Super Mario 64* (1996), a game with three-dimensional graphics instead of two-dimensional side-scrolling.

Nintendo did not release a *Mario* game at the launch of either the Nintendo

GameCube or the Nintendo Wii, but Mario did eventually appear on the systems in the form of *Super Mario Sunshine* (2002) and *Super Mario Galaxy* (2007), respectively. Since then, Mario has starred in numerous games for the Wii U, 3DS, and Switch.

In addition to his own titles, Mario has appeared as the main character in role-playing games (RPGs) such as *Super Paper Mario* (2007); sports games such as *Super Mario Kart* (1992), *Mario Golf* (1999), and *Mario Tennis* (2000); and even educational games such as *Mario Teaches Typing* (1991). With appearances in hundreds of games and on thousands of items of merchandise, there is no telling where Mario will appear next.

Bryan-Mitchell Young

See also: *Mario Kart* Series; Nintendo

Further Reading

Cifaldi, F. "Sad but True: We Can't Prove When *Super Mario Bros.* Came Out." Gamasutra, March 28, 2012. Available at https://gamasutra.com/view/feature/167392/sad_but_true_we_cant_prove_when_php.

Iwata, Satoru. "Iwata Asks: New Super Mario Bros.Wii." Nintendo, November 13, 2009. Available at http://iwataasks.nintendo.com/interviews/#/wii/nsmb/0/0.

Kent, Steven L. *The Ultimate History of Video Games: From Pong to Pokémon and Beyond*. Roseville, CA: Prima, 2001.

Nintendo. "Super Mario Maker Has Sold 1 Million Units around the World." September 18, 2015. Available at https://www.businesswire.com/news/home/20150930005585/en/Super-Mario-Maker-Has-Sold-1-Million-Units-around-the-World.

Nix, M. "IGN Presents: The History of *Super Mario Bros.*" IGN, November 8, 2007. Available at https://www.ign.com/articles/2010/09/14/ign-presents-the-history-of-super-mario-bros.

NPR Staff. "Q&A: Shigeru Miyamoto on the Origins of Nintendo's Famous Characters." NPR, June 19, 2015. Available at https://www.npr.org/sections/alltechconsidered/2015/06/19/415568892/q-a-shigeru-miyamoto-on-the-origins-of-nintendos-famous-characters.

Sheff, David. *Game Over: How Nintendo Zapped an American Industry, Captured Your Dollars, and Enslaved Your Children*. New York: Random House Inc., 1993.

Masculinity

Video games emerged within a cultural context of technology and leisure in the 1970s. The technology driving video games combined the familiar television interface with military research, creating a product that bridged the military-industrial complex with the growing electronic leisure sector (Newman 2017). Although the early video games were advertised as family entertainment, by the mid-1980s, the medium had shifted to target boys and double down on the perceived core demographic amid an industry crisis (Watkins 1984). This shift in industry marketing, combined with cultural discourses that linked computer technologies with men, began the process of systematically erasing or neglecting women and girls' engagement with video games. Advertisements, popular media, and the games themselves almost exclusively addressed the pleasures, fantasies, and imaginaries of white heterosexual boys. Early games, defined by titles such as *PONG* (1972) and *Space Invaders* (1978), predominantly featured masculinized activities, such as fighting, shooting, and sports. This "militarized masculinity," defined by aggressive competition and violence, continues to define much of video game culture today (Kline, Dyer-Witheford, and de Peuter 2003, 246–268).

As video games became associated with boyhood domestically, the gendering of the public video arcade space also contributed to the medium's masculinization. Just as pinball arcades had been demonized by local governments in the 1940s, emerging video game arcades were linked to concerns about seedy practices of a particular male criminal element, such as smoking, drinking, cutting class, stealing, and loitering. The video games that filled these arcades, like *Donkey Kong* (1981) and *Dragon's Lair* (1983), featured gameplay and narratives aimed at a young male demographic, despite female interest in breakout hits such as *Pac-Man* (1980) and *Ms. Pac-Man* (1982) that deviated from the status quo.

FROM FAMILY ROOMS TO BEDROOMS

The hobbyist computer geek subculture that emerged in the 1970s was also one dominated by men and boys. Popular discourse largely constructed video games as a technology rather than just home entertainment, resulting in the culture surrounding video games and computers being associated with and shaped by patriarchal language, rituals, and customs that systematically excluded women and girls (Thornham 2008). In the 1980s, game consoles began to migrate from shared family rooms to boys' bedrooms, where they would gestate for another decade and cultivate their association with boyhood power fantasies (Flynn 2003). This shifting of play spaces, from family rooms to private spaces of engagement, contributed to the formation of dominant video game culture, which retreated into hegemonic masculine subject matter such as excessive violence and sexuality throughout the 1990s, resulting in emblematic and popular titles such as *DOOM* (1993), *Duke Nukem 3D* (1994), *Tomb Raider* (1996), *Goldeneye 007* (1997), and *Halo* (2001). Popular discourse contributed to this gendered construction, including the media concerns espoused by mainstream news venues, the infamous congressional hearings of 1993, and the insular coverage in game-specific magazines. Despite efforts to cultivate and design for the sizable but neglected female gaming population in the mid-1990s (Cassell and Jenkins 1998), women were systematically victimized, erased, or marginalized in the games, marketing, and discourse surrounding the most popular video games of this era.

CASUAL AND HARDCORE GAMES

Characterized by games such as PopCap's *Bejeweled* (2001) and King's *Candy Crush Saga* (2012), casual games first emerged in the early 2000s as web-based games and eventually as mobile applications to challenge many traditional game design tropes and expand the market of games beyond young men (Chess 2017). With simplified, cartoonish graphics and intuitive controls, casual games sharply deviated from their discursive opposite, hardcore games, which were characterized by complex, sometimes obtuse, mechanics, a tendency toward photo-realistic visuals, and an emphasis on action and shooting. Along with the games themselves, dominant video game culture began to frame players as either the feminized casual or the masculinized hardcore, denoting their preferences but also establishing a hierarchy of perceived value (Kubik 2012).

Simultaneous with the rise of casual games, online multiplayer games became inundated with hegemonic masculine performances (Gray 2014). Since casual games opened up the previously niche, masculinized gaming culture to a popular, feminized audience, self-identified hardcore gamers perceived casual games as, paradoxically, a frivolous but serious threat to the idea of video games as a sanctuary for hegemonic, white masculinity (Vanderhoef 2013). Casual games were frivolous because hardcore gamers did not consider them to be "real games," but many gamers still saw their popularity as a threat to the traditional masculinist games and mechanics that had dominated the market for over a decade. As casual games became the dominant force in the economics and industry of video games after the introduction of smartphones, the enmity hardcore gamers felt for any genre, aesthetic, mechanic, or, indeed, audience that deviated from the hegemonically masculinized norm continued to grow.

#GAMERGATE

The toxicity of hegemonic masculinity in gaming culture reached a fever pitch in August 2014 with the formation of the #gamergate movement across social media. After an ex-boyfriend of game designer Zoe Quinn accused her of using her contacts in gaming journalism to garner positive reviews of her indie game *Depression Quest*, a contingent of self-identified gamers marshaled a campaign of hatred and harassment against her—and eventually against many other female, queer, and transgender game critics and designers. Based on misogyny and a growing distrust of indie game communities further deviating from traditional game genres, #gamergate became a boiling point for the alt-right contingent of hardcore gaming culture that fears progressive influence on video game culture, which they view as a last bastion against calls for social justice and inclusion across cultural spaces.

As the #gamergate phenomenon grew, it waged a campaign that almost exclusively targeted feminist and progressive critics, developers, and scholars engaged in critiques of the gaming industry and culture (Chess and Shaw 2014). Despite this marginal form of white supremacist masculinity in gaming, other forms of masculinity in gaming culture offer sustained critiques and alternative expressions.

ALTERNATIVE MASCULINITIES

The emergence of a robust amateur and indie game development sector, along with a growing body of "dad games," which explore the paternalistic and emotional connection between fathers and children, has offered challenges to the toxic and patriarchal formation of masculinity historically linked to video games. Part of this reconfiguring of video game masculinity includes an embrace of sensitive and paternal masculinity as well as queer masculinities that challenge the heteronormative status of video game culture. Indie game makers such as Robert Yang have explored queer masculinities through a series of games centered on gay male subcultures. Furthermore, triple-A blockbuster games have embraced a more paternal, rather than strictly patriarchal, protagonist in games centered on the experience of fatherhood (Voorhees 2016). Highlighting an aging game development workforce, which is still dominated by men (Consalvo 2008), dad games such as *The Last of Us* (2013) and the first season of Telltale's *The Walking Dead* (2012) explore fatherhood and paternalism through masculinities that fluctuate between extreme violence and caregiving for children, suggesting an industry and culture that is beginning to reevaluate the ways it manifests gendered performances in its games. Despite these critiques and developments, a core of militarized white masculinity still permeates dominant video game culture (Gray and Leonard 2018), illustrating the legacy of the medium's origins in military research and the violent imaginaries of early tech culture.

John Vanderhoef

See also: Femininity; Gamergate; Gender

Further Reading

Cassell, J., and Henry Jenkins. *From Barbie to Mortal Kombat: Gender and Computer Games*. Cambridge, MA: MIT Press, 1998.

Chess, S. *Ready Player Two: Women Gamers and Designed Identity*. Minneapolis: University of Minnesota Press, 2017.

Chess, S., and Adrienne Shaw. "A Conspiracy of Fishes, or, How We Learned to Stop Worrying about #GamerGate and Embrace Hegemonic Masculinity." *Journal of Broadcasting & Electronic Media* 59, no. 1 (2014): 208–220.

Consalvo, M. "Crunched by Passion: Women Game Developers and Workplace Challenges." In *Beyond Barbie and Mortal Kombat: New Perspectives on Gender and Gaming,* edited by J. Demer, C. Heeter, Y. B. Kafai, and J. Y. Sun, 177–193. Cambridge, MA: MIT Press, 2008.

Flynn, B. "Geographies of the Digital Hearth." *Information, Communication & Society* 6, no. 4 (2003): 551–576.

Gray, K. L. *Race, Gender, and Deviance in Xbox Live: Theoretical Perspectives from the Virtual Margins*. New York: Routledge, 2014.

Gray, K. L., and David J. Leonard. "Not a Post-Racism and Post-Misogyny Promised Land: Video Games as Instruments of (In)Justice." In *Woke Gaming: Digital Challenges to Oppression and Social Injustice,* edited by Kishonna L. Gray and David J. Leonard, 3–24. Seattle: University of Washington Press, 2018.

Kline, S., N. Dyer-Witheford, and G. de Peuter. *Digital Play: The Interaction of Technology, Culture, and Marketing*. Montreal, Ontario: McGill-Queens University Press, 2003.

Kubik, E. "Masters of Technology: Defining and Theorizing the Hardcore/Casual Dichotomy in Video Game Culture." In *Cyberfeminism 2.0*, edited by Radhika Gajjala and Yeon Ju Oh, 135–152. New York: Peter Lang Publishing, 2012.

Newman, M. Z. *Atari Age: The Emergence of Video Games in America*. Cambridge, MA: MIT Press, 2017.

Thornham, H. "'It's a boy thing': Gaming, Gender, and Geeks." *Feminist Media Studies* 8, no. 2 (2008): 127–142.

Vanderhoef, J. "Casual Threats: The Feminization of Casual Video Games." *Ada: A Journal of Gender, New Media, and Technology*, no. 2 (2013). Available at https://doi.org/10.7264/N3V40S4D.

Voorhees, G. "Daddy Issues: Constructions of Fatherhood in *The Last of Us* and *BioShock Infinite*." *Ada: A Journal of Gender, New Media, and Technology* no. 9 (2016). https://adanewmedia.org/2016/05/issue9-voorhees/.

Watkins, R. "A Competitive Assessment of the U.S. Video Game Industry." Washington, DC: United States International Trade Commission, 1984.

Massively Multiplayer Online Role-Playing Games (MMORPGs)

A massively multiplayer online role-playing game (MMORPG) is a type of video game where hundreds to thousands of players log into a common server and play simultaneously in a persistent game world. Players assume the role of a fictional character in the form of an avatar. Although most MMORPGs are played on a personal computer, several titles have been released for consoles with varying degrees of success. Early game titles often followed fantasy themes; however, since their inception in both text and graphical forms, there have been many successful massively multiplayer online games based on science fiction and superhero themes, among others, as well. As online virtual game worlds have expanded beyond the role-playing genre, MMORPGs are now often broadly referred to as massively multiplayer online games (MMOGs).

MMORPGs find their roots in tabletop fantasy games such as TSR's Dungeons & Dragons (1974) as well as in early text-based computer environments known as multiuser domains (or dungeons [MUDs]) from the late 1970s. The first graphical MMORPG was *Meridian 59* (1995), although the first widespread and well-known one was *Ultima Online* (1997), by Origin Systems and Electronic Arts (EA). The term *massively multiplayer online role-playing game* is said to have been coined by Richard Garriott in 1997, shifting the name of the genre from *graphical MUDs* to *MMORPGs*. Sony/Verant's *EverQuest* (1999) pushed the boundaries of cooperative social gameplay, and as of 2019, the best-selling MMORPG is Blizzard's *World of Warcraft* (*WoW* [2004]), which has thrust MMORPGs into the mainstream with more than twelve million subscribers.

MMORPGs are consistently maintained for content and software updates that repair gameplay issues on a regular (often weekly) basis, commonly referred to as *patching*. For larger content additions, often referred to as *expansions*, players must pay an additional onetime fee and install (or download) the expansion content to be added to their current game.

Many mainstream MMORPGs are based on a *pay-to-play* (P2P) subscription business model with varying monthly rates and require high-speed internet access as well as up-to-date technical specifications, such as a range of minimal and optimal processor speeds and video and sound cards. There are also many *free-to-play* (F2P) MMORPGs, such as Cryptic Studios' *Star Trek Online* (2011), NCSoft's *Guild Wars 2* (2012), and Funcom's *Secret World Legends* (2017), that are often subsidized through third-party advertising. Other business models include basic free access while enabling players to purchase in-game items and pay for additional game content; these are often termed *freemium* games. In recent years, with the increase in processing power of mobile technologies, MMORPGs such as Netmarble's *Lineage II: Revolution* (2016) can be played on tablets and high-powered smartphones.

All in-game player activity occurs in real time and requires the player to be logged into the game world. To play, the player must connect to the game world through a host client, usually run by the publisher of the game, which also stores the player character data. Once connected, players must select (or be assigned) a server, also sometimes referred to as a *shard* or *real*. These are parallel game worlds that are set to accommodate a particular number of simultaneously connected players (sometimes more than two thousand). From a technical perspective, this is done so that players' gameplay is not affected by technical issues that arise from having too many people connected to the same network, such as a slowing down in performance (often referred to as *lag*) and disconnection. The number of servers is dependent on the number of active players for any given game title. Traditionally, players could not communicate or play with players on other servers. However, there have been moves toward some games offering cross-server chat and even enabling players to search for group members for certain cross-server adventures.

Some MMORPGs focus on *player-versus-player* (PvP) combat that pits player characters against each other in competition for resources and progression, whereas other games focus solely on *player-versus-environment* (PvE) gameplay, in which players cannot combat each other but primarily focus on cooperation for success. There can still be competition for resources and progression in PvE-style games, but the designed game goal does not include combat with other players. There are also games that offer both PvP and PvE gameplay, either on different servers or within designated areas of the game world, such as battlegrounds and arenas.

Regardless of a game's specific genre, MMORPGs generally share several common characteristics or game mechanics. It should be noted that this description is meant to be a general overview of gameplay mechanics in MMORPGs and not an exhaustive description of all play mechanics in all MMORPG titles. Avatar creation and customization is a dominant feature of all MMORPGs. Players are often able to select what gender, race, and occupation they want to play from a predetermined, and game-specific, selection as well as many other physical attributes, such as eye color, hair color, and style. As computer graphics improve, players have been able to select an increasing amount of personalized detail such as nuanced skin tones, height, girth, and more. As a part of role-playing, players also choose their player character's name. Customization continues throughout gameplay as players accumulate and upgrade their armor and weapons as their player characters increase in level.

MMORPG gameplay is predominantly centered on character progression, whether defined by character levels or the development of abilities. Character level progression is capped in all MMORPGs, but the level cap varies by title and can change even within a particular title through patches and expansions. Although level caps exist, new content and additional features are constantly implemented, often leading to the perception that MMORPGs have no real end.

Character progression is often accomplished by killing enemy non-player characters (NPCs) known as *mobs*; however, in some games, progression occurs through skills training as opposed to killing and questing. By doing so, a player accumulates experience points that are added to the player character's current level. When a player accumulates enough experience points, the player character can progress to the next level. By doing so, the player character increases in strength and ability, enabling it to combat more difficult NPCs or work on higher-level skills training. Depending on the game, progression may also occur by completing various in-game tasks, such as quests or missions. Successful completion of these tasks also gives experience points depending on the task's difficulty level in accordance with the player character's current level.

Through both combat and quests, players may also acquire various artifacts, such as armor, weapons, and other trinkets, that may be used or carried by the player character or sold to in-game vendors. In-game currency, which varies in name and value depending on the specific game, can also be accumulated through quests and combat but often has no impact on a player character's level progression (other than being able to buy better weapons, armor, and spells). The game world's economy is a very vibrant part of many MMORPGs. Players engage in the active exchange of buying and selling in-game goods, whether player-created or found artifacts; each MMORPG title carries with it its own economic structure and value.

Although the in-game economy is designed to be developed and sustained by players, there has been an increasing growth of *gold farmers*—players (or automated, scripted "bots") who collect in-game monies to be sold later on a third-party website. Players can use real-world currency to purchase in-game artifacts such as armor and weapons or in exchange for in-game currency. While this goes against many game publishers' legal terms and was even considered cheating by the publisher, as well as by other players within the game, some game companies, and those specifically using the freemium model, allow players to purchase in-game currency with real-world money through the game directly.

Social interaction is an integral part of the MMORPG game experience. Gameplay often requires cooperation with other player characters, making gameplay a social activity as well. To complete many quests successfully and be victorious in combat and exploration, players must form groups that draw a balance between the various skill sets available in any particular game. From healers to damage dealers, games often have some variation on the combination necessary to succeed, and all require the player to cooperate with other players in some way. Players form small groups of usually six to eight members (actual group size depends on the specific game) to accomplish smaller tasks and quests, such as the repetitive NPC killing, referred to as *grinding*, necessary to progress the player character's level and for the completion of in-game quests. These groups can be short term and temporary, sometimes drawing on the general population of the server. This type of group is known as a *pick-up group*, or *PUG*. In PUG situations, commitment to each other is only tied to the task at hand. Players may also group with other players they know, either through previous play experiences or by in-game reputation.

Larger groups are necessary to accomplish more complex or challenging tasks, such as successfully killing a *boss mob*, which may require fifty or more people, depending on the game, to work together toward a common goal. For larger-scale combat, players often join *guilds*, also sometimes referred to as *clans* or *kinships*. Guilds allow players to interact with other players that have the same gameplay goals or share similar play styles. The two most common types of guilds that have emerged are hardcore raiding guilds that focus on conquering high-level content with speed and efficiency and "family" or social guilds, which tend to be more socially oriented groups that focus on helping members progress through a game in a more casual atmosphere.

For all types of groups and guilds, in-game communication is important for both socializing and coordinating adventures. All games use various types of chat that are specific to a particular need, such as private messages between two players, group chat (where only members in your current group can read the messages), guild chat (which is limited to guild members), and a broad range of other chat spaces that include raid chat (limited to all members in a particular raid), auction chat (which focuses on the sale and exchange of items across the server), and many more. More recent MMORPG titles also include various forms of voice chat, enabling players to communicate using programs such as Ventrillo or TeamSpeak.

Many games host external websites as a gateway of information for the player community concerning game-related information such as updates and upcoming expansions and technical issues. Official websites also host discussion forums where players can interact with each other as well as offer a space where players can discuss game issues with customer service representatives and game designers.

A growing number of websites are hosted by players, guilds, fans, and interested third-party companies. Content can range from the sharing of in-game experiences and information pertaining to gameplay and progression to the creation of fan fiction, artwork, and even gameplay movies. Many guilds have their own websites to maintain contact with players while outside the game world as well as to share in-game knowledge and conquests outside of the game world.

MMORPGs are not without their controversies, both within and outside of the game world. One of the most prevalent issues that surround MMORPG gameplay is addiction. Because of the time-consuming nature of MMORPG gameplay, companies have been accused of knowingly creating products that are difficult for players to leave or stop playing because of the ongoing addition of game content or because of a sense of social obligation some players may feel is inescapable during MMORPG gameplay. Similarly, the repetitive nature of combat and killing in many MMORPGs has been cause for concern in regard to violence and desensitization in both youth and adult players.

Kelly Boudreau

See also: Online Games

Further Reading

Boudreau, Kelly. "Online Role-Playing Games." In *The Video Game Explosion: A History from PONG to PlayStation and Beyond*, edited by Mark J. P. Wolf, 173–176. Westport, CT: Greenwood Press, 2007.

Chan, E., and P. Voderer. "Massively Multiplayer Online Games." In *Playing Video Games: Motives, Responses, and Consequences*, edited by Peter Voderer and Jennings Bryant, 77–87. Mahwah, NJ: Erlbaum, 2006.

Collins, C. "Ninja Looters, Gold Farmers, and N00bs: Commodities and Digital Resources." In *Proceedings of the 2008 Senior Symposium in Anthropology Department of Anthropology*, Idaho State University, April 30, 2008.

Consalvo, Mia. "MOOs to MMOs: The Internet and Virtual Worlds." In *The Handbook of Internet Studies*, edited by Robert Burnett, Mia Consalvo, and Charles Ess, 326–347. Malden, MA: Wiley-Blackwell, 2010.

Jakobsson, M., and T. L. Taylor. "The Sopranos Meets EverQuest: Social Networking in Massively Multiplayer Online Games." In *Proceedings of Digital Arts & Culture 2003*, 81–90. Melbourne, Australia, 2003.

Kelly, R. V. *Massively Multiplayer Online Role-Playing Games: The People, the Addiction, and the Playing Experience*. Jefferson, NC: McFarland & Company, 2004.

Lin, Holin, and ChuenTsai Sun. "Massively Multiplayer Online Role Playing Games (MMORPGs)." In *The International Encyclopedia of Digital Communication and Society*, edited by Robin Mansell, Pieter Ballon, and Peng Hwa Ang, 1–7. Hoboken, NJ: Wiley, 2015.

Meredith, A., Z. Hussain, and M. Griffiths. "Online Gaming: A Scoping Study of Massively Multi-Player Online Role-Playing Games." *Electronic Commerce Research* 9, nos. 1–2 (2009): 3–26.

O'Connor, Erin L., Huon Longman, Katherine M. White, and Patricia L. Obst. "Sense of Community, Social Identity and Social Support among Players of Massively Multiplayer Online Games (MMOGs): A Qualitative Analysis." *Journal of Community & Applied Social Psychology* 25, no. 6 (2015): 459–473.

Ramirez, Fanny Anne. "From Good Associates to True Friends: An Exploration of Friendship Practices in Massively Multiplayer Online Games." In *Social Interactions in Virtual Worlds: An Interdisciplinary Perspective*, edited by Kiran Lakkaraju, Gita Sukthankar, and Rolf T. Wigand, 62–79. Cambridge, UK: Cambridge University Press, 2018.

Steinkuehler, C. "Massively Multiplayer Online Gaming as a Constellation of Literacy Practices." *eLearning* 4, no. 3 (2007): 297–318.

Yee, N. *The Daedalus Gateway*. 2005. Available at http://www.nickyee.com/daedalus.

Mattel Intellivision

At the time of the Intellivision's release in 1979, the nascent video game industry was stumbling and trying to determine how to sell video game systems to the public: as toys, as computers, or as electronic home entertainment systems. Into this arena came Mattel, then the largest toy manufacturer in the world (Kent 2001, 195), primarily known for its line of Barbie dolls named after founder Elliot and Ruth Handler's daughter Barbara. Mattel had originally bought into the video game craze with a line of low-end handheld electronic games, including *Auto Racing* (1976), *Football* (1977), and *Hockey* (1978). The Mattel Electronics division grew considerably with the arrival of the Intellivision, Mattel's first foray into home game systems.

In direct competition with the Atari VCS 2600, the Intellivision was technologically superior to the 2600, with improved graphics, more memory, and a roster of more complex games. The Intellivision could display sixteen colors on its 159-by-96 pixel screen (which displayed as 159-by-92 scan lines on a television set). Whereas the Atari VCS 2600 ran off of an 8-bit processor, the Intellivision was the first system to have a 16-bit processor. Initially the system sold for $299, and *Las Vegas Poker & Blackjack* came as a pack-in cartridge. Game controllers for the Intellivision included a twelve-button keypad with a more precise, directional disk.

The Intellivision was first widely sold in the United States beginning in 1980 and is considered a second-generation console. Popular Intellivision games included *Sea Battle* (1980) and *Astrosmash* (1981). Game developer Activision also released titles for the Intellivision, and several notable arcade games of the time (*Donkey Kong* [1981], *BurgerTime* [1982], and *Dig Dug* [1982]) were adapted for the system. Like early Atari and Magnavox Odyssey games, some Intellivision games, such as the *Advanced Dungeons & Dragons* series (1981–82), included plastic overlays that had to be placed on the television set while playing parts of a game.

In addition to releasing the Intellivision directly, Mattel also sold the unit to RadioShack, Sears, and GTE-Sylvania to sell the console as a so-called rebadged unit under their brands. The Intellivision also distinguished itself from competitors through a series of additional peripherals, including its promised, but never delivered, keyboard component (canceled after the company was fined by the Federal Trade Commission in 1982), a music synthesizer keyboard, and the Intellivoice speech device released in 1982. In 1983, Mattel released a revamped and updated system as the Intellivision II. This new Intellivision was housed in gray plastic, as opposed to the "woodgrain" and brown housing of the original model.

Perhaps one of the most memorable aspects of the Intellivision was its television and print advertising campaign starring pundit George Plimpton, who touted the system's superiority over Atari, claiming, "This is intelligent television." During its era, Intellivision was respected for its graphics, and eventually 115 games were released for this system by Mattel and other developers. The "intelligence" or "smartness" of this system is best understood through the enhanced gameplay it enabled through a faster processor, better graphics, and its unique game controller. Like most video game systems of its era, the Intellivision suffered major losses in the United States market following the video game crash of 1983. The system was eventually completely discontinued by 1991, long after newer systems such as the Nintendo Entertainment System (NES) and SEGA Genesis had taken command of the video game marketplace.

In 1997, Intellivision programmers Keith Robinson and Stephen Roney bought the rights to the system and its games and started Intellivision Productions. The company released compilations of Intellivision games for MS-DOS, Windows, and Macintosh, and in 2005, it announced that new Intellivision cartridges would be produced. It has also licensed games for the Sony PlayStation, and to AtGames Digital Media, who produced the Intellivision Flashback in 2014. In 2018, Intellivision Productions became Blue Sky Rangers Inc., with the IP rights for the system and games transferred to Intellivision Entertainment, a new company that plans to release a new console, the Intellivision Amico, in 2020.

Sheila C. Murphy

See also: Generations of Technology

Further Reading

Intellivision Lives website. Accessed October 22, 2020. Available at http://www.intellivisionlives.com.

Kent, Steven L. *The Ultimate History of Video Games: A History from Pong to Pokémon and Beyond*. Roseville, CA: Prima Publishing, 2001.

Murphy, Sheila C. *How Television Invented New Media*. Piscataway, NJ: Rutgers University Press, 2011.

Maxis Software

Founded by Will Wright and Jeff Braun in 1987, Maxis Software is the game development studio best known for creating the *Sim* series, the franchise of simulation games widely credited with pioneering the strategy or “god game” genre. Maxis started as a small, independent studio, but after its initial success and a troubled growth spurt in the early 1990s (including the company’s 1995 decision to go public), Maxis was acquired by Electronic Arts (EA) in 1997 and is now a wholly owned subsidiary of the major game developer and publisher. Wright, the acclaimed game designer considered the true creative visionary behind Maxis, left the company in April 2009 to start his own independent entertainment think tank.

Maxis was formed out of a chance meeting between cofounders Wright, a programmer and fledgling game designer, and Braun, an investor looking for an entry point in the games industry at a time when Wright was struggling to distribute his urban planning simulator *SimCity* (1989), which allowed players to manage the complex inner workings of their own self-created cities from a somewhat removed, or “godlike,” vantage point. Wright had self-published a version of *SimCity* for the Commodore 64 home computer but was struggling to find an audience for the game, which, with its open-endedness and nonviolent content, was a decided departure from the linear, quest-based structure of the majority of games that were highly popular at the time. However, Maxis struck a copublishing deal with Broderbund in 1989, at which point *SimCity* was rereleased. After sluggish initial sales due to its unconventional nature, *SimCity* went on to achieve critical acclaim and vast commercial success, becoming one of the best-selling computer games of all time.

SimCity's success prompted Maxis to grow quickly for an independent developer and also gave way to a host of *Sim* spin-offs that allowed players to manage everything from an entire planet (*SimEarth* [1990]) to an ant colony (*SimAnt* [1991]), with all degrees of scope and complexity in between. However, none of these spin-offs were nearly as successful as the original *SimCity*; for another such success, Maxis had to wait for the release of a sequel, *SimCity 2000*, in 1994. Riding the financial high of *SimCity 2000*, Maxis went public in June 1995 in a $38 million initial public offering. There was also a shift toward a more corporate leadership of the company, with Wright and Braun ceding their top management roles, as well as a new emphasis on producing a greater quantity of titles according to strict deadlines.

This approach yielded decidedly mixed results. For example, in 1996, Maxis sought to ship four titles in the span of a year, resulting in *SimCopter* (1996), Wright's biggest project at the time, being shortchanged development time and resources and ultimately being shipped in what Wright considered an incomplete form. Maxis also sought and ultimately failed to diversify its game lineup so that it did not rely so heavily on *Sim* titles, trying its hand at everything from children's software to more conventional action/adventure titles, almost all of which were considered failures.

Because of its lackluster performance after going public, Maxis was forced to consider acquisition offers and ultimately accepted a $125 million stock offer from the Redwood, California–based developer and publisher Electronic Arts in June 1997. EA was primarily interested in Maxis for the remaining prestige of the *Sim* series brand and hoped to use the Maxis name in its pursuit of a greater share of the computer game market, shifting the studio's mandate even more decisively toward the creation of top-ten titles.

Maxis's new parent company was initially somewhat skeptical of Wright's first major endeavor under the EA banner—a "virtual dollhouse" game called *The Sims* (2000), which allowed users to create and manage the lives of a family of simulated people, or "Sims." However, despite EA's initial reluctance to release *The Sims* because of its seemingly mundane premise, the game quickly overtook even the *SimCity* franchise as the best-selling computer game of all time and would ultimately go on to spawn multiple expansion packs and sequels.

Although Wright and Maxis initially maintained a lead development role in the *Sim* series following Maxis's acquisition by EA, more recent titles (such as *SimCity Societie*s [2007], the *MySims* series [2007], and *The Sims 3* [2009]) have been developed and published without the direct involvement of Wright or Maxis, with EA either developing new *Sim* projects internally or tasking them to external developers. For example, the highly popular *Sims* franchise is now fully under the purview of EA's in-house Sims Studio.

Maxis's and Wright's next biggest project was *Spore* (2008), a simulation game that allows players to create and control life from the level of a single-celled organism all the way up to the creation and management of entire solar systems—an ambitious endeavor somewhat jokingly dubbed “Sim Everything” by both industry pundits and Wright himself (Terdiman 2005). Released in 2008 after a series of production delays, the *Spore* franchise (and its host of planned sequels and spin-offs) is now being managed by Maxis without Wright at the helm. He departed to form the Stupid Fun Club, an entertainment think tank dedicated to the creation and development of cross-media intellectual property, in April 2009.

In 2012, a new logo for the Maxis brand was introduced, and the following year, the brand returned with two new releases, *The Sims 3: University Life* (2013) and *SimCity* (2013), the latter being an updated release of the original classic game. In 2016, Maxis became part of EA Worldwide Studios.

Jessica Aldred

See also: Industry; Meier, Sid; Molyneux, Peter; Simulation Games; Wright, Will

Further Reading

Keighley, Jeff. “The Endless Hours of *The Sims Online.*” GameSpot. Available at https://web.archive.org/web/20070224005758/http://www.gamespot.com/gamespot/features/pc/simsonline/index.html.

Keighley, Jeff. “SIMply Divine: The Story of Maxis Software.” GameSpot. Available at https://web.archive.org/web/19991012021220/http://gamespot.com/features/maxis/index.html.

Kline, Stephen, Nick Dyer-Witherford, and Greg De Peuter. “Sim Capital.” In *Digital Play: The Interaction of Technology, Culture, and Marketing*, 259–293. Montreal, Canada: McGill-Queen’s University Press, 2003.

Pearce, Celia. “Sims, Battlebots, Cellular Automata, God and *Go*: A Conversation with Will Wright.” *Game Studies* 2, no. 1 (July 2002). Available at http://www.gamestudies.org/0102/pearce/.

Terdiman, Daniel. “Wright Hopes to Spore Another Hit.” *Wired*, May 20, 2005. Available at http://www.wired.com/gaming/hardware/news/2005/05/67581.

McGonigal, Jane (1977–)

Jane McGonigal is a game designer and futurist known for her work in alternate reality games (ARGs). McGonigal, who holds a PhD in performance studies with an emphasis in film studies, is heavily influenced by the positive psychology movement and is an advocate of games as a means to facilitate collaboration and problem-solving and to aid in self-improvement. She is the director of Game Research and Development at the Institute for the Future, a nonprofit future forecasting think tank that began as a spin-off of the RAND Corporation in 1968. McGonigal is a proponent of the use of games to address real-world problems and to improve society and individual lives.

McGonigal’s notable game projects are primarily in the alternate reality game

(ARG) genre. Her breakout game for which she served as puppet master, *I Love Bees* (2004), was a viral marketing game for the launch of *Halo 2* (2004). Following this success, she moved to a part think tank, part game designer position, setting her sights on a Nobel Prize for game design. She has subsequently developed a number of games for the corporate and nonprofit sectors, producing projects for the American Heart Institute, Accenture, Disney, Intel, the International Olympics Committee, Nike, Microsoft, the New York Public Library, and Nintendo.

McGonigal has also worked on projects such as *World without Oil* (2007), for which she served as participation architect, and the future-forecasting ARG *Superstruct* (2008). She led the development team of *Find the Future: The Game* (2011), an online and site-specific ARG deployed as part of the New York Public Library's centennial celebration, and the self-care and recovery game *SuperBetter* (2012), which she designed in part to help her with her own recovery after suffering a concussion.

I Love Bees received the Innovation Award at the 2005 Game Developers Choice Awards and a Webby Award in the Game-Related category. McGonigal received the South by Southwest Interactive Award for Activism in 2010 and was included in the *O: The Oprah Magazine* 2010 O Power List, which lists important women.

She is the author of two books: *Reality Is Broken: Why Games Make Us Better and How They Can Change the World* (Penguin, 2011) and *SUPERBETTER: A Revolutionary Approach to Getting Stronger, Happier, Braver, and More Resilient* (Penguin, 2015). *Reality Is Broken*, which became a best seller, argues that games can improve motivation and engagement, build community, and make people happier; throughout, the book draws on examples from ARGs and massively multiplayer online role-playing games (MMORPGs) alongside a variety of games that McGonigal herself has developed. *SUPERBETTER* is based on similar principles to those that informed her design for the game of the same name, suggesting that people can use the skills and competencies they use to play games for self-improvement. McGonigal wrote the book and developed the game of the same name after her own experience with a traumatic brain injury.

Jennifer deWinter and Carly A. Kocurek

See also: Serious Games

Further Reading

Joiner, Whitney. "Super Girl." *Elle*, June 22, 2011. Available at https://www.elle.com/culture/tech/a11688/jane-mcgonigal-game-designer/.

"Q&A: Quizzing the Queen Bee of ARGs, Jane McGonigal." Gamasutra, March 19, 2007. Available at https://www.gamasutra.com/view/news/104134/QA_Quizzing_The_Queen_Bee_Of_ARGs_Jane_McGonigal.php.

Mega CD. *See* SEGA CD/Mega-CD

Mega Drive. *See* SEGA Genesis/SEGA Mega Drive

Meier, Sid (1954–)

Sid Meier is one of the most prominent game makers in the video game industry and is best known for his *Civilization* series. He was the cofounder of the prominent but now defunct game developer and publisher MicroProse and was the cofounder of developer Firaxis.

Meier was born on February 24, 1954, in Sarnia, Ontario, Canada, but grew up in Detroit. He attended the University of Michigan in the 1970s, where he learned programming and started to create simple games on the university's mainframe computers. His first job was with electronics corporation General Instruments. In 1982, he and fellow employee J. W. "Wild Bill" Stealey founded MicroProse, which swiftly became successful enough to provide full-time work. Meier worked as the designer, and Stealey was the business manager.

Meier's games in the 1980s typically focused on military subjects, including flight simulators such as *Hellcat Ace* (1982), *F-19 Stealth Fighter* (1988), and *Gunship* (1989) as well as military strategy games such as *NATO Commander* (1983) and *Crusade in Europe* (1985). His first game to really break from this mold was *Sid Meier's Pirates* (1987), a historical simulation role-playing game (RPG) about sixteenth- and seventeenth-century Caribbean privateers. This game was also significant because it was the first of many to use Meier's name as a marketing tool, a technique more common in the film industry than in the video game industry.

In the late 1980s and early 1990s, Meier's game projects and Stealey's interests began to diverge. Meier sold out his share of the company to Stealey and stayed on as a contract worker. *Railroad Tycoon* (1990), Meier's first game that focused on building rather than fighting, was part of his inspiration to work on *Civilization* (1991), which did not receive a great deal of support from the company. The game was a surprise hit, but MicroProse still floundered financially, and Stealey sold it to Spectrum Holobyte in 1993. Meier stayed on several more years, working on a few more games, but he eventually left in 1996 to cofound Firaxis with Jeff Briggs and Brian Reynolds.

By this time, Meier's role in game production had shifted. Throughout the 1980s and into the early 1990s, he was not only the designer of his games but also the programmer and even did some of the artwork. He had a reputation for guarding his code carefully and being involved with every aspect of his games. By the late 1990s, however, he had moved more into the role of creative director, giving general direction and feedback as a kind of quality control. Firaxis has nevertheless made a point of attaching Meier's name to every title it has released.

After creating Firaxis, Meier released a few new games, such as *Sid Meier's Gettysburg* (1997), *Sid Meier's Alpha Centauri* (1999), and *Sid Meier's Sim Golf* (2002). Since the early 2000s, most of his games have been remakes and sequels of previous titles, such as *Sid Meier's Pirates!* (2004), *Sid Meier's Civilization IV* (2005), *Sid Meier's Railroads* (2006), *Sid Meier's Civilization: Revolution* (2007), *Sid Meier's Civilization V* (2010), and *Sid Meier's Civilization VI* (2016). *Sid Meier's Civilization: Beyond Earth* (2014) was a space-themed variation on the familiar game. The only truly new titles were tactical fighter games: the World War I–era aerial combat game *Sid Meier's Ace Patrol* (2013) and the spaceship-themed *Sid Meier's Starships* (2015).

Meier has received numerous accolades for his work. He is one of the most decorated video game industry veterans; his most prominent recognitions include being inducted into the Computer Museum of America's Hall of Fame in 2002 and receiving the Game Developer's Choice Lifetime Achievement Award in 2008. Perhaps the only other designers in the industry with the same kind of stature are Shigeru Miyamoto and Will Wright. Although his titles are not all universally acclaimed (in candid interviews, Meier is sometimes quite critical of some of his titles, especially early ones), many of them have received positive reviews and end up as best sellers. Numerous critics and fans consider several of his titles, such as *Civilization,* to be some of the best video games ever created.

Kevin Schut

See also: MicroProse

Further Reading

DeMaria, Rusel, and Johnny L. Wilson. *High Score! The Illustrated History of Electronic Games*. Berkeley, CA: McGraw-Hill/Osborne, 2002.

Edwards, Benj. "The History of Civilization." Gamasutra, July 18, 2007. Available at http://www.gamasutra.com/view/feature/1523/the_history_of_civilization.php.

Takahashi, Dean. "Civilization's Father, Sid Meier, Shares 25 Years of Insights on His Beloved Series." Venture Beat, February 20, 2016. https://venturebeat.com/2016/02/20/our-interview-with-sid-meier-on-the-next-25-years-of-civilization-games/.

Mental Health. *See* Health (Mental)

Merchandising

In the video game industry, *merchandising* refers to the practice of licensing the intellectual property (IP) of a given game (including, but not limited to, its characters, weaponry, iconography, and fashion) and spinning it off into ancillary products or merchandise that seek to extend the game's cultural reach and financial profit beyond its primary incarnation as interactive software. Typically, a third-party manufacturer, or *licensee,* acquires a license from the game publisher, or *licensor*, to make merchandise based on its game for a preestablished period of time, with most major game titles granting multiple licenses to produce a range of merchandise designed to take full advantage of the game's synergistic potential. The most common types of video game merchandise include action figures, dolls, toys, books, and clothing, although there has been a growing drive in recent years to innovate game merchandise beyond these traditional categories.

Once a relatively small, youth-focused marketing category within the entertainment industry—compared with the types of merchandising blitzes launched on behalf of major Hollywood blockbuster films, for example—video game merchandising has, in the past decade, become more pervasive and potentially lucrative. This growth can, in part, be attributed to the increased cultural and economic prominence of video games as a medium in their own right as well as the expanded consumer base that can be appealed to through merchandising because gamer demographics now include a sizeable adult audience.

Video game merchandising has always heavily relied on strong, recognizable game characters whose distinctive images can be extracted and repurposed outside of the context of gameplay. Even some of the earliest forays into game merchandising—such as that commissioned by Taito for the arcade hit *Space Invaders* (1978) or, even more famously, by Namco for *Pac-Man* (1980)—demonstrated this reliance on character, with the tentacled alien attackers of the former and eponymous chomping yellow circle of the latter providing a stamp of brand identity to everything from plush toys to baseball caps to board games to bedsheets and even (in *Pac-Man*'s case, at least) breakfast cereal and pasta noodles. Although these largely abstract, two-dimensional sprites may seem primitive by today's near photo-realistic standards for video game characters, given the relative graphical simplicity of these early digital worlds, characters provided the most identifiable means of extending a game into other types of merchandise. Characters are the primary means through which players identify with and become invested in a video game, so they provide one of the easiest ways to encourage fans to consume merchandise in addition to the game itself.

Nintendo's rise to dominance of the North American console market in the latter half of the 1980s was fueled in part by the Japanese console and software manufacturer's success in putting forth distinctive characters that readily translated into mainstream child- and youth-targeted merchandise, such as dolls and toys, including the mustachioed plumber Mario of the *Mario* series as well as the elfin hero Link of *The Legend of Zelda* series. As Marsha Kinder (1993) has suggested, by situating the world of video games within other, more familiar contexts associated with children's culture, video game merchandise sought out a larger audience for the games themselves at the same time as they diversified revenue streams for the game company (109). Children unfamiliar with the games (or video games in general) might seek them out after seeing or playing with their toy spin-offs; conversely, those players wishing to expand Mario's or Link's in-game adventures beyond the finite number of levels of their respective games could do so through imaginative play with the action figurines based on their favorite characters. Game characters became proprietary symbols, the recognition and value of which were maximized through licensed products.

Nintendo's *Pokémon* franchise, launched in North America in 1999, three years after taking Japan by storm, still represents one of the most blatant and successful examples of character-driven merchandise designed to capitalize on all facets of the youth market. (At the peak of its popularity in 2000, Pokémon had more than fifty licensees producing hundreds of products; see Kline et al. 2003, 240.) With a Nintendo Game Boy game that necessitated the capture, collection, and training of various adorable creatures called Pokémon (or "pocket monsters," in English) at its center, the *Pokémon* franchise created licensed merchandise that was tightly integrated with the game's focus on creature collection and reinforced by the emphatic franchise slogan, "Gotta catch 'em all!" For example, younger kids could collect the toys, move on to the trading cards, and then to the various video games in the series, spin-off animated television shows, and *Pokémon* movies, all of which support this exhaustive, cross-media consumption by emphasizing the name, identity, and importance of collecting each character—who, for example, tend to chant their own names repeatedly so that children quickly figured out who was who (Chua-Eoan and Larimer 1999).

The merchandising appeal and potential of video games has since come to transcend the boundaries of children's and youth culture. For example, Lara Croft, the buxom, gun-toting star of the *Tomb Raider* series, has yielded multiple action figures and collector's edition models, the appearance and steep price tag of which are aimed at the adult collector rather than the child gamer, similar to the body-armored space warrior Master Chief of Bungie's *Halo* series. Because *Tomb Raider* and *Halo* are game franchises that have been bound to platform-exclusivity agreements for the Sony PlayStation and the Microsoft Xbox, respectively, these "grown-up" examples of character-based merchandising reflect the older demographic of gamers that Sony and Microsoft sought to court with their game consoles and many of their exclusive titles.

Because major game releases are now thought of as entertainment "events" and the games themselves as potentially long-lasting franchises with multiple spin-offs and sequels, console manufactures and game publishers alike are increasingly being targeted by licensing companies and brand developers for their merchandising potential across a wider range of both products and consumer demographics. Now often referred to as *brand extension*, contemporary video game merchandising seeks to contextually support the experience of the game while also ensuring consumer interest in the franchise before and between game releases (Scheiner 2007). There has been a proliferation of online stores—such as that created for MTV Games' *Rock Band* franchise—that allow fans to create and customize their own game merchandise, including do-it-yourself T-shirts, accessories, and character figurines.

Publishers now also frequently release their big-budget titles as part of special, premium-priced "collector's editions," which package game software with merchandise tightly tied in to the brand identity of the game. Favorite items for inclusion range from seemingly authentic weaponry (e.g., the working night vision goggles in *Call of Duty: Modern Warfare 2: Prestige Edition* [2009]) to character costumes and accessories (such as the black canvas duffle bag found in the *Grand Theft Auto IV: Special Edition* [2008]) to custom lithographs and art books (such as that included in the *Mass Effect: Limited Edition* [2007]). This special edition bundling ensures the purchase of additional game merchandise at the point of sale, with price tags for such packages usually starting at nearly double the cost of the game alone. Other franchises instead adhere more closely to the model of merchandise release laid out by the film industry in which at least several major items (soundtrack, clothing, action figures, etc.) are rolled out in the weeks before the game's debut as a means of building anticipation and buzz, with the bulk of the remaining tie-ins launched at the time of release.

For its part, the gaming community remains largely divided when it comes to the merchandising spin-offs of their favorite games; although some espouse the collecting of merchandise as an enjoyable and worthwhile extension of their enthusiasm for and engagement with their favorite games, others have dismissed it as mere frivolity that distracts from the achievement of hardcore gameplay (Ruberg 2005). Henry Jenkins (2006) suggests that conventional licensing arrangements impose such limiting terms of use on a game's intellectual property that the resulting products are often viewed as cheap spin-offs that appropriate only the most superficial aspects of a beloved title. To counter this disillusionment, there has been a growing move toward developers, publishers, and licensees working together to co-create ancillary media—usually in the form of graphic novels, novels, comics, and films—that participate in expanding the fictional world of the game, a trend Jenkins terms "transmedia storytelling." (This is evident, e.g., in Electronic Arts' *Dead Space* franchise, which released graphic novel and animated film prequels to the game that established the backstory of the game world without being redundant of the game itself.) By consuming these other media forms, players may learn new information about the game world and their opponents therein, which ultimately may assist with—rather than distract from—their gaming achievements.

Jessica Aldred

See also: Adaptation; Advertising; Art; Packaging

Further Reading

Chua-Eoan, Howard, and Tim Larimer. "Beware of the Pokémania," *Time*, November 14, 1999. Available at http://content.time.com/time/magazine/article/0,9171,34342,00.html.

Jenkins, Henry. *Convergence Culture: Where Old and New Media Collide*. New York: New York University Press, 2006.

Kinder, Marsha. *Playing with Power in Movies, Television and Video Games: From Muppet Babies to Teenage Mutant Ninja Turtles*. Berkeley: University of California Press, 1993.

Kline, Stephen, Nick Dyer-Witheford, and Greg De Peuter. "Pocket Monsters: Marketing in the Perpetual Upgrade Marketplace." In *Digital Play: The Interaction of Technology, Culture, and Marketing*, edited by Greig de Peuter, 218–245. Montreal: McGill-Queen's University Press, 2003.

Ruberg, Bonnie. "Video Game Merchandise." *The Escapist*, December 20, 2005. Available at http://www.escapistmagazine.com/articles/view/issues/issue_24/152-Video-Game-Merchandise.

Scheiner, Matt. "Thinking Outside the [Game] Box." *The Licensing Book* (November/December 2007): 26.

Sheff, David. *Game Over: How Nintendo Conquered the World*. New York: Random House, 1993.

Meridian 59

Developed by Archetype Interactive and published by the 3DO Company, *Meridian 59* (1995) is the first video game to be considered a massively multiplayer online role-playing game (MMORPG). The game was inspired by earlier online multiplayer games and was conceived by brothers Andrew and Chris Kirmse as the first three-dimensional graphical MUD (multiuser dungeon or domain). More members were added to the design team, an alpha version of the game was ready in 1995, and the game was commercially released in 1996. According to game archaeologist Justin Olivetti, "The game was the first internet game from a major publisher, the first time that an MMO got covered in major game magazines, the first graphical MMO to move beyond 2-D, the first MMO to have a flat rate monthly subscription, the first MMO sold in a retail box, the first MMO that was accessible via the internet instead of a service provider, and the first MMO that used the web to handle accounts and deliver a client download" (Olivetti 2016). As of late 2019, is still in operation, making it the longest-running MMORPG. Originally, players paid $10.95 a month to play, but today players can join and play for free.

The setting of *Meridian 59* is a fantasy world that is a provincial colony cut off from the empire that established it. It is divided into Barloque, the capital city; the towns Jasper, Tos, Marion, and Cor Noth; and Ko'Catan, a jungle island settlement. Players can customize their avatars and join various factions, though they can only play human characters. Over its many years of existence, *Meridian 59* has developed a community of hardcore players, many of whom have become longtime friends (Parkin 2014). After 3DO shut down the game in 2000, leaked server files allowed the game to continue, and it was also picked up and rereleased by Near Death Studios, a company started by former developers of *Meridian 59*. When Near Death Studios closed in 2010, the game was released as freeware.

Although it was soon overshadowed by the "big three" MMORPGs of the late 1990s (*Ultima Online* [1997], *EverQuest* [1999], and *Asheron's Call* [1999]), and late by *World of Warcraft* (*WoW* [2004]), *Meridian 59* will always hold an important place in video game history, and will continue to be the longest-running MMORPG until it closes.

Mark J. P. Wolf

See also: Massively Multiplayer Online Role-Playing Games

Further Reading

Meridian 59 website. Accessed October 3, 2020. Available at https://www.meridian59.com/.

Olivetti, Justin. "The Game Archaeologist: Meridian 59." Massively Overpowered, February 27, 2016. Available at https://massivelyop.com/2016/02/27/the-game-archaeologist-meridian-59/.

Parkin, Simon. "The Last Survivors of Meridian 59." *The New Yorker*, May 9, 2014. Available at https://www.newyorker.com/tech/annals-of-technology/the-last-survivors-of-meridian-59.

Metagames

The terms *metagame* and *metagaming* respectively designate self-reflexive design, play, and cultural practices. By way of minimal definition, we may say that *metagame* refers to certain games or game elements that reflect critically and comment on games' status as media objects, whereas *metagaming* refers to certain play practices that transcend the primary game objectives and rules. Such transcendence may involve modifying or breaking the game, and it may even extend the game to other social contexts, such as online discussion forums. Both terms remain notoriously fuzzy due to their overexposure in marketing and fandom discourses. By the same token, this definitional fuzziness reminds us that most key terms in game studies, such as *game* and *play*, remain preliminary and contested (Zimmerman 2004, 159). Nevertheless, both terms indicate a self-reflexive awareness that manifests itself in a game's design, narrative, and user appropriation.

To overcome the terminological fuzziness, we may fruitfully consult other disciplinary definitions of metareferentiality. Media studies scholars have considered self-reflection a key indicator for a medium's sophistication (Nöth and Bishara 2007). According to this line of argument, video games have matured to the degree that they have made the activities of playing and designing games the object of their representation and play and display an awareness of multiple levels of agency that can be called up during play (see Metalepsis). Literary scholar Patricia Waugh defines *metafiction* as a kind of writing that "self-consciously and systematically draws attention to its status as an artefact to pose questions about the relationship between fiction and reality" (Waugh 2013, 2). Metafiction critically reflects on literary compositional methods and even contemplates the fact that human conceptions of "reality or history are provisional," constructed, and in that sense fictional as well (7). Because language is an arbitrary representational system, metafiction serves as a means for exploring the gulf between language and the reality it seeks to reference. Video games, of course, do not share the same emphasis on representation as literary texts. However, an increasing number of games display critical self-reflexivity and even blur the line between game and real world (e.g., *Pokémon GO* [2016]).

A focus on unorthodox design has been the staple of several independent studios that produce smaller games, or *indie games*, sometimes through crowdfunding via websites such as Kickstarter.com. By crowdsourcing their game projects' finances and directly connecting with, and often creating, a customer base, they circumvent gatekeepers like established publishers and banks. Because of their limited resources, these games often trade on original game design and art design, but they are also prone to reflect on the history of the medium and their own status as games. Retrogames like *Shovel Knight* (2014) recall the aesthetics and design philosophy of the 1980s and 1990s side-scrolling platforming games, such as the *Mega Man* series. *Undertale* (2015) parodies dialog-based role-playing games (RPGs) with subversive humor and metalepsis. Experimental metagames like *Pony Island* (2016) reflect on, through their gameplay and story, what it means to code and play video games (see Metalepsis). *Darkest Dungeon* (2016), is a turn-based strategy game with a strong emphasis on managing one's character roster and a rudimentary story. The game, in which players explore randomly generated dungeons, violates, according to design director Tyler Sigman, every design principle in the book. For instance, the game intentionally frustrates players via a mental health mechanic that can permanently kill one or all characters that players have painstakingly leveled up. The design here foregrounds the metagame, the strengths and weaknesses of each character as represented by numeric values. What ties these games together is that they refer back to an established canon of genres, games, and design principles that they can then call up, modify, and subvert.

But there are also instances in which metagaming becomes a function of narrative, specifically, or of character development. *Uncharted 4: A Thief's End* (2016), an action-adventure game with an *Indiana Jones*–like story, includes one sequence in which the protagonists Nathan and Elena have a tense conversation over dinner about the fact that Nathan wants to return to his former life as an adventurer. He tries to clear the air by offering to play Elena for the duty of doing the dishes. The arena for the contest is Elena's favorite game: the platformer *Crash Bandicoot* (1996). The character dialog, communicated via cutscene, foregrounds Nathan's conflicting feelings of inadequacy in his current role and not wanting to disrupt the domestic happiness that he found. On the surface, he suggests the game to prove his skill and dexterity; however, he does so knowing that he will not be able to beat Elena's high score (he has never played before). By being framed in this manner, the subsequent session of *Crash Bandicoot* becomes the site for negotiating the characters' interpersonal dynamics, as the game-within-a-game emblemizes that negotiation.

Metagaming, as a practice, occurs on its own spectrum, which extends from subversive to invasive in terms of the integrity of a game's original code. Stephanie Boluk and Patrick LeMieux propose an extended definition of the metagame, which includes the various social and economic activities surrounding playing (digital) games. They argue that the history of video games has been mischaracterized by emphasizing design instead of usage. Therefore, the term *game* must encompass how we play before, after, and around games. Online community chats, in-game microtransactions, and even the purchase of the game, all factor into this extended definition. These practices can also be subversive and directed against video games' commercial nature and the corporate market-capitalist logic they emanate from (Boluk and LeMieux 2017, 3). Similarly, Carter, Gibbs, and Haropp have suggested adopting the terms *paragaming* and *orthogaming*, designating activities in and with games that they consider peripheral.

This extended notion of play can also generate new communities. For instance, speedrunning, a manner of play in which the objective is to reach the end of a game as quickly as possible, has become its own subculture within gaming (https://www.speedrun.com/). Similar communities have sprung up around "the meta" of *Hearthstone* (2014) as well as the *Diablo* and *Pokémon* series.

The most invasive mode of metagaming consists in modifying ("modding") the original source code of games. Often operating in legal gray areas, "modders" have produced numerous versions of canonic games such as *Super Mario Bros.* (1985), *DOOM* (1993), and *Half-Life* (1998). In some instances, as with *Counter-Strike* (2000), a mod of *Half-Life*, these mods have become institutions in their own right, sometimes even becoming reabsorbed by the original copyright holders. Nintendo has recently completed such a circle of crowdsourced design with its *Super Mario Maker* (2017, 2019) series, in which players take up the mantle of designer and construct their own levels and challenges and share them in an online archive.

Metagames constitute a multifarious and ambivalent phenomenon, just as metagaming may constitute a subversive practice that questions the ideological structures that produce games and blur the lines between game design and play.

Damien B. Schlarb

See also: Glitches; Metalepsis; Speedruns; Video Games within Video Games

Further Reading

Boluk, Stephanie, and Patrick LeMieux. *Metagaming: Playing, Competing, Spectating, Cheating, Trading, Making, and Breaking Videogames*. Minneapolis: University of Minnesota Press, 2017.

Carter, Marcus, Martin Gibbs, and Mitchell Harrop. “Metagames, Paragames and Orthogames: A New Vocabulary.” In *FDG ’12: Proceedings of the International Conference on the Foundations of Digital Games*, 11–17. New York: ACM, 2012. Available at https://doi.org/10.1145/2282338.2282346.

Nöth, Winfried, and Nina Bishara, eds. *Self-Reference in the Media*. Berlin, Germany: De Gruyter, 2007.

Waugh, Patricia. *Metafiction*. New York: Routledge, 2013.

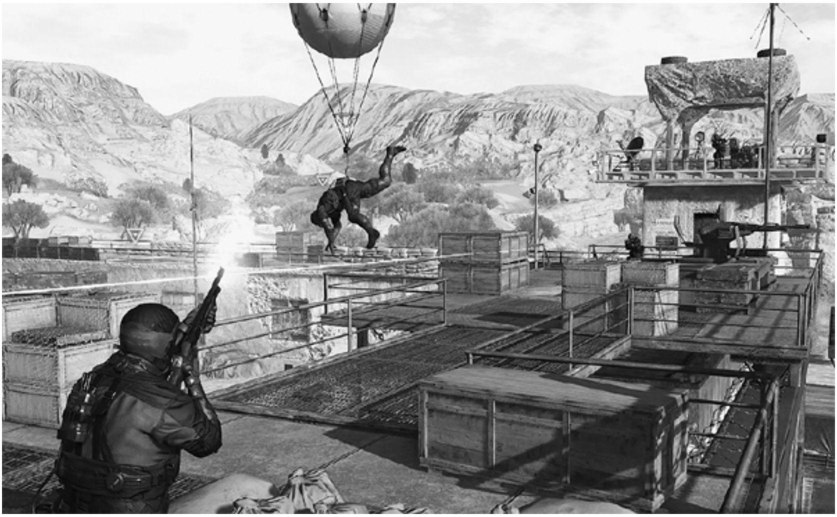
Zimmerman, Eric. “Narrative, Interactivity, Play, and Games: Four Naughty Concepts in Need of Discipline.” In *First Person: New Media as Story, Performance, and Game*, edited by Noah Wardrip-Fruin and Pat Harrigan, 154–164. Cambridge, MA: MIT Press, 2004.

Metal Gear Series

Metal Gear is a critically acclaimed series of stealth-action video games created by Hideo Kojima. It was first developed and produced by Konami. Kojima Productions took over development in 2005, up until its dissolution as a Konami subsidiary in 2015. After all contractual ties were officially severed with Konami, Kojima reincorporated the company as an independent studio (in December of the same year), but because the rights to the series still belong to Konami, Kojima Productions and its creator are no longer working on *Metal Gear* titles.

The main series begins with *Metal Gear* (1987) and its sequel *Metal Gear 2: Solid Snake* (1990). The original versions of these games were distributed solely in Japan for use on the MSX2. The *Metal Gear Solid* subseries consists of *Metal Gear Solid* (1998), *Metal Gear Solid 2: Sons of Liberty* (2001), *Metal Gear Solid 3: Snake Eater* (2004), *Metal Gear Solid 4: Guns of the Patriots* (2008), *Metal Gear Solid: Peace Walker* (2010), and *Metal Gear Solid V: Ground Zeroes* (2014), a prologue to the final game of the series: *Metal Gear Solid V: The Phantom Pain* (2015).

In addition, there exist many noncanonical titles that are not considered a part of the series' ongoing narrative, although, in certain cases, maintain ties with it: *Metal Gear 2: Snakes' Revenge* (1990), a game designed without Kojima's consent and creative support, and a follow-up to the American port of the first *Metal Gear* on the Nintendo Entertainment System (NES); *Metal Gear Solid: Ghost of Babel* (2002), released for the Game Boy Color; both *Metal Gear Acid* titles (2004 and 2005); and the two games from the *Metal Gear: Portable Ops* series (2006 and 2007), playable on the PlayStation Portable (PSP). Also, there is *Metal Gear Arcade* (2010), a port of *Metal Gear Online* (2008), an online multiplayer mode initially included with *MGS4*, which was released solely in Japan, and makes use of stereoscopic imagery.



A screenshot from *Metal Gear Online* (2014). (Courtesy of Mark J. P. Wolf)

In addition, there is a mobile line of noncanonical games comprising *Metal Gear Solid Mobile* (2008) for mobile phones and N-Gage, *Metal Gear Solid: Touch* (2009) for the iPod Touch and iPhone, and—only available in Japan—*Metal Gear Solid: Social Ops* (2012) for the iOS and Android platforms.

In February 2013, Konami released *Metal Gear Rising: Revengeance* (developed by Platinum Games), the first title (other than rereleased titles) playable on a Microsoft platform (as Sony had lost exclusivity). It features Raiden as the main player character and takes a step away from the stealth genre, adopting a more action-oriented stance. Finally, *Metal Gear Survive,* the first game of the series released since Hideo Kojima's departure from Konami, was released on February 20, 2018.

Through the years, the series also had its share of add-ons, such as the *Metal Solid: VR Missions* (1999). Rereleases included *Metal Gear Solid: Subsistence* (2005), an iteration of the third canonical game, which includes both original MSX2 *Metal Gear* games, making them available to the North American market. Compilations of the series include the *Metal Gear Solid: HD collection* (2011 and 2012).

The series mainly revolves around the missions of four elite soldiers: Naked Snake (*MGS3, MGS: Portable Ops, MGS: Peace Walker, MGSV: GZ*), who will later become known as Big Boss (the "genetic father" of Solid Snake, Liquid Snake, Solidus Snake, and the Genome soldiers); Venom Snake (*MGSV: TPP*); Solid Snake (*Metal Gear, Metal Gear 2, MGS, MSG2's Tanker Episode, MGS4*); and Raiden (*MGS2, MGR*). Each mission ultimately involves finding and neutralizing the many iterations of the Metal Gear, a bipedal (Metal Gear Zeke, D, TX-55, Rex, Rey, and Gekkō) or submersible (Arsenal Gear) tank with nuclear missile launching capabilities.

According to the *Metal Gear Solid 4 Database*, although the games take place between 1964 (*MGS3*) and 2014 (*MGS4*), the story's timeline begins in early American history, when the Patriots created the Sons of Liberty, a name that will later be used by Solidus Snake's terrorist group in the events of *MGS2* (this still holds true as of 2019, as the *MGSV* opuses take place between 1974 and 1984, and the 2018 events of *MGR: Revengeance* are not considered canon). The series' fictional events and characters' backstories are often connected with actual historical events, and the series also tends to blend real scientific facts and military technology with their fictional equivalents. For example, although the gamer might need to administrate diazepam, a real benzodiazepine-derived drug used for treating anxiety, insomnia, seizures, and muscle spasms, to stabilize the aim of the player character, the protagonist's stamina, strength, and reflexes are also enhanced by injected (and fictional) nanomachines that can supply adrenaline, nutrients, and sugar or restrict the host's actions. The same goes for the military and scientific organizations—such as the CIA, DARPA (real), and FOX HOUND (fictional)—involved in the series' conflicts. This mixture of facts and (science) fiction is one of the defining traits of the *Metal Gear* saga.

Initially designed to be an action wargame, the technical limitations of the MSX2 forced Kojima to reconsider his overall gameplay stance. As he explained in a *Gamers Today* interview, "Creating a war game for MSX was a little difficult because of the limitation on the sprites. When you get four enemies or even four bullets on the screen at once, the screen starts blinking and it just doesn't work" (Kent 1998). Therefore, the game designer decided to take another approach. Instead of fighting all the soldiers, the player character would have to sneak past them and avoid being spotted. To circumvent opposition, the games have a large inventory of infiltration tools, the most famous being the cardboard box, as well as many weapons that often serve more than offensive purposes. Although most of the gameplay mechanics were enhanced or refined through the course of the series, many were already present in the 1987 game. As a result, the original *Metal Gear* is often identified as the game that introduced the stealth genre, whereas *Metal Gear Solid*, the first title of the series published worldwide, is widely recognized as the game that made the genre popular.

The *Metal Gear* series demonstrates Hideo Kojima's interest in filmmaking through movie references and the series' general aesthetic. Each game begins with an opening title with the names of the voice actors and relies heavily on cutscenes. During gameplay, the games rely on an overhead or over-the-shoulder third-person point of view that, at certain points, changes to prescripted fixed camera shots, adding to the cinematic feel of the games. Most games of the *Metal Gear Solid* series also allow the player to switch to a first-person point of view.

This perspective is often treated as if the player character had a camera instead of eyes, as seen in *MGS2* when droplets of rain accumulate on the screen. This tends to reinforce the feeling that the gamer's journey is mediated through a filmic apparatus.

The series is also renowned for its high degree of videoludic self-consciousness. At many points during a gameplay session, the gamer is reminded of his or her role within the simulation. Although this auto-reflexivity is constantly and subtly present under different forms within the games, it occasionally peaks by having the characters refer directly to the interface and game hardware. For example, in *Metal Gear Solid*, during the battle against Psycho Mantis, Roy Campbell—Solid Snake's commander—asks the gamer to plug the game controller in the second port of the console to prevent the psychic Fox Hound member from using his telepathic powers.

Although the series is widely acknowledged for its original and immersive gameplay, Hideo Kojima's vision as a video game author and the game's resulting intricate narrative—mostly delivered through lengthy noninteractive sequences (some can run up to an hour)—has received its just share of praise and criticism from the gaming community and academic circles. For Steven Poole, "the multiple twist and turns of the thriller plot are highly enjoyable, dropping little hints as to the true nature of your mission and the organisation you work for, keeping you guessing as to how it will all turn out" (Poole 2000, 110). Whereas for Grant Tavinor, "the tone of the games is widely erratic, with vulgar jokes placed alongside very stylish sequences intended to convey seriousness" (Tavinor 2009, 113). The poor taste of some of these creative choices eventually led to controversy. For instance, the rather revealing outfit of *MGSV*'s character Quiet—including the game's rather unconvincing explanation that she can only breathe through her skin—as well as the mishandling of sensitive themes such as sexual violence in *MGSV: GZ* led to accusations of sexism and misogyny from both critics and the gaming community. Such chauvinistic takes on the representation of women, which can be traced back to a *Metal Gear Solid*'s Easter egg that allowed the players to catch Meryl Silverburgh in her underwear, providing that they follow her into a women's bathroom quickly enough, are indeed questionable and detract from the otherwise profound antimilitary, antinuclear, and technoskeptical messages as well as the identity-oriented and relationship-oriented themes of the games.

As for the excessively long cutscenes, in an interview given to Adam Doree (for *Kikizo*) in 2008, Kojima expressed doubts about the effectiveness of a certain type of interactive storyline in which the gamer is free to select what he wants to see. While confessing that he chooses "the easy way" when using cutscenes to carry the narrative of the games, he also stresses that doing otherwise might not get the gamer as emotionally involved. Therefore, while the sometimes unbalanced ratio between gameplay sequences and cutscenes, combined with the occasional crude and misplaced humor, might be polemical, they remain a truthful reflection of Kojima's vision of storytelling and true to his style as a game designer and video game author (Stanton 2015).

Guillaume Roux-Girard

See also: Kojima, Hideo

Further Reading

Doree, Adam. “Hideo Kojima: The Kikizo Interview 2008.” Kikizo Archives, August 24, 2008. Available at http://archive.videogamesdaily.com/features/hideo-kojima-interview-2008-p1.asp.

Kent, Steven L. “Hideo Kojima *Gamers Today* Interview.” *Gamers Today*, 1998. Available at https://web.archive.org/web/20120916175025/http://www.metalgearsolid.net/features/hideo-kojima-game-guru-movie-maniac.

Poole, Steven. *Trigger Happy: Videogames and the Entertainment Revolution*. New York: Arcade Publishing, 2000.

Stanton, Richard. *A Brief History of Video Games. The Evolution of a Global Industry*. Philadelphia, PA: Running Press, 2015.

Tavinor, Grant. *The Art of Videogames*. Hoboken, NJ: Wiley-Blackwell, 2009.

Metalepsis

Metalepsis roughly translates to “frame breaking” and refers to moments within a story in which various levels of narration become muddled: narrators may comment on the fact that they are relating a story, and authors may interject themselves into the narration to draw attention to the fact that the story at hand is their invention. Originating in classical Greek (legal) rhetoric, the term was introduced to literary studies by the French narratologist Gérard Genette, who defines it as “any intrusion by the extradiegetic narrator or narratee into the diegetic universe (or by diegetic characters into a metadiegetic universe, etc.), or the inverse” (1980 234–235). Narratologists have since expanded Genette’s definition to further distinguish, among others, between rhetorical, or minimalist, metalepsis, in which narrative and narrated world remain separate, and ontological metalepsis, in which entities from either level of narration interact directly (Kukkonen and Klimek 2011; Pier 2013; and Ryan 2004). While it remains an understudied concept in video game studies (Giaponne 2015; Harpold 2007; Schlarb 2019), media studies scholars have proposed considering metalepsis as the very framework for understanding player interaction with the diegetic world of narrative-driven games (Neitzel 2007).

Scholars in media studies, culture studies, and aesthetics continue to debate the term’s exact scope and efficacy. Technically, metalepsis designates a referential shift. Like its figurative brethren, *metaphor* and *metonomy*, metalepsis belongs to a group of phenomena that are syntactically and etymologically ambivalent. Genette uses the term inconsistently in his study, but others have noted it to constitute a “contamination” and a “violation of sematic thresholds” (Pier 2013). Despite these attributes, however, metalepsis does not in all cases disrupt narrative illusion and therefore is not inherently transgressive (Klimek 2010). From this vantage point, metalepsis, together with other disruptive aesthetic phenomena (e.g., glitches), emblemizes the fundamental instability of all representation.

Some consider metalepsis an emergent phenomenon that forms part of a larger (postmodern) trend according to which media become increasingly self-referential, self-reflexive, or autotelic (cf. Nöth 2007). This diagnosis has generated controversy regarding the status of semiotic referentiality: while some celebrate an increase in self-referentiality as a sign of “increasing critical consciousness” and thus of a medium’s aesthetic maturation, others are weary of this trend because it implies that representation can work without recourse to any external (material) referent. The role of video games in this debate remains contested, even though some have claimed that games are the medium par excellence for demonstrating the referentially hermetic nature of all representation (Nöth 2007, 7).

The act of “breaking the fourth wall” is also prominent in performative media such as theater and film. For instance, Berthold Brecht’s epic theatre attempts to cultivate political awareness in its audience by trying to prevent cathartic identification with the *dramatis personae*. Actors address the audience directly and refer to their characters as roles they play so as to disrupt the illusion. Rhetorical metalepsis has also become common practice in comic books (e.g., the *Maus* and *Deadpool* series) as well as film and television series (cf. Feyersinger 2010; e.g., *House of Cards*). Across all media, the efficacy and potential radicalness of metalepsis depends on both audience expectations and media affordances (Kukkonen and Klimek 2011).

Video games display the full spectrum of metaleptic meaning, ranging from mundanely diegetic to subversive. For starters, any pause or options screen may be considered metaleptic. In the same vein, command line, text-based adventures such as *Zork* (cf. Neitzel 2007) address players directly to prompt input. In the last decade, major publishers’ attempts at expanding and diversifying audiences in terms of age and gender demographics have fostered more complex narratives with multiple frames and mature themes. Most narrative-driven games contain metaleptic elements, such as transmedial storytelling (*Quantum Break* [2016]), multiple narrative perspectives (*Beyond Two Souls* [2013] and *Detroit: Become Human* [2018]), and interactive storytelling (Telltale Game’s *Walking Dead* series [2012–18]).

Several games include metaleptic moments that are more in line with Genette’s original definition and feature various degrees of subversiveness (cf. Schlarb 2019). For instance, the hack-and-slash adventure game *X-Men* (1993), for the SEGA Genesis, asks players to “reset the computer” in one of its later levels. Players are expected to lightly tap the console’s reset button rather than flick any virtual switch in the game world. The game did not have a “save file” feature; therefore, players were risking their progress if they held the button down too long. In *Metal Gear Solid* (1998), a character with telekinetic and telepathic abilities activates the controller’s vibration feature and reads the content of memory cards, depending on the player’s dialogue choices. *Batman: Arkham Asylum* (2009) includes a sequence in which players see glitches (visual and audio artifacts) and are made to think that their consoles have broken down, just as Batman, the protagonist, suffers the effects of a fear-inducing toxin (see also Glitches). Meanwhile, the eponymous protagonist of *Deadpool* (2015) argues on the phone with the game’s director over budget and level design.

Metagames, a genre that has garnered commercial and critical acclaim in the past decade, is arguably structured almost exclusively around the principle of metalepsis. *Pony Island* (2016) employs at least four discernible levels of narrative framing: players interact with a cursed virtual arcade cabinet by (1) playing through the cabinet's mundane jump-and-run game, (2) hacking and manipulating its core code, and (3) text messaging with several entities (a ghost and Satan) "haunting" the cabinet. After completing the game, (4) the same ghost prompts players to erase the game from their computers to set it free. The first-person-perspective puzzle game *The Stanley Parable* (2011) features a narrator who comments in real time on the protagonist's (and thus the player's) actions and routinely intervenes in the game's plot by adding plot devices, such as a time bomb, and by looping and restarting the story.

Overtly disruptive forms of metalepsis occur in the context of piracy and cheat prevention on the side of game publishers. Pirated copies of *Grand Theft Auto IV* (2008) feature a permanently shaking camera that makes navigating the game world virtually impossible. *Alan Wake* (2010) displays the eponymous protagonist with an eye patch, a stereotypical cultural marker for pirates. Online multiplayer games such as *World of Warcraft* (*WoW*) have even created so-called prison servers that segregate players who in any way have manipulated the game to gain unearned advantages from others.

Representational strategies and self-referentiality in video games have indeed become more sophisticated, and reading this sophistication as an index of the medium's overall maturation seems cogent. Metalepsis in video games runs the gamut from mundane to avant-gardist. Still, mainstream video games demonstrate a proclivity toward nondisruptive forms of metalepsis. For example, *Super Mario Odyssey* (2017), a 3-D action platformer, includes recurring sections in which players control a 2-D, 9-bit Mario sprite, complete with MIDI-format music and side-scrolling control scheme. The frame breaking here does not further direct the in-game narrative, nor does it disrupt gameplay in a way that defamiliarizes gaming as an activity; nevertheless, these sections call up and reflect on the legacy of the *Mario* franchise and presume players' familiarity with the 1980s graphic aesthetic and design principles. *Rhetorical* and *ontological* remain useful heuristic parameters for assessing the narrative quality of such ergodic metalepsis. However, we will need to expand our vocabulary to account for the machine and player extradiegetic actions that are also part of any gaming experience (cf. Galloway 2006) and therefore may become part of metaleptic reference.

Damien B. Schlarb

See also: Glitches; Metagames

Further Reading

Feyersinger, Erwin. "Diegetic Short Circuits: Metalepsis in Animation." *Animation* 5, no. 3 (December 2010): 279–294.

Galloway, Alexander R. *Gaming: Essays on Algorithmic Culture*. Minneapolis: University of Minnesota Press, 2006.

Genette, Gérard. *Narrative Discourse*. Ithaca, NY: Cornell University Press, 1980.

Giappone, Krista. "Self-Reflexivity and Humor in Adventure Games." *Game Studies* 15, no. 1 (2015). Available at http://gamestudies.org/1501/articles/bonello_k.

Hanebeck, Julian. *Understanding Metalepsis: The Hermeneutics of Narrative Transgression*. Berlin, Germany: De Gruyter, 2017.

Harpold, Terry. “Screw the Grue: Mediality, Metalepsis, Recapture.” *Game Studies* 7, no. 1 (2007). Available at http://gamestudies.org/0701/articles/harpold.

Klimek, Sonja. *Paradoxes Erzählen: die Metalepse in der phantastischen Literatur*. Paderborn, Germany: Mentis, 2010.

Kukkonen, Karin, and Sonja Klimek. *Metalepsis in Popular Culture*. Berlin, Germany: De Gruyter, 2011.

Neitzel, Britta. “Metacommunication in Play and in (Computer) Games.” In *Self-Reference in the Media*, edited by Winfried Nöth and Nina Bishara, 237–252. Berlin, Germany: De Gruyter, 2007.

Nöth, Winfried. “Self-Reference in Postmodernity and in the Media.” In *Self-Reference in the Media*, Winfried Nöth and Nina Bishara, 3–30. Berlin, Germany: De Gruyter, 2007.

Pier, John. “Metalepsis.” In *The Living Handbook of Narratology*, edited by Peter Hühn et al. Hamburg, Germany: University of Hamburg, 2013. Available at https://wikis.sub.uni-hamburg.de/lhn/index.php/Metalepsis.

Ryan, Marie-Laure. “Metaleptic Machines.” *Semiotica* 2004, no. 150 (2004): 439–469.

Schlarb, Damien. “Narrative Glitches: Action Adventure Games and Metaleptic Convergence.” In *Playing the Field: Video Games and American Studies*, edited by Sascha Pöhlmann, 195–209. Berlin, Germany: De Gruyter, 2019.

Metaphor

The notion of metaphor has been used with regard to computer games since computer games were first analyzed as objects of scholarly study. Metaphor can be applied to contexts of game reception as well as game production.

In the context of game reception, concepts and instances of metaphor are applied to the interpretation and interpretability of games. When computer games were first considered narrative, authors mused about how graphically abstract games with little to no narrative content might possibly be interpreted. A prime example is Janet Murray’s famous reading of the abstract game classic *Tetris* (1984), which she interpreted as a metaphor for the busy working life of American office workers in the 1990s (Murray 1997, 144). This implies that computer games are texts; on the other hand, this can be considered not as an interpretation of a game object but of an individual gameplay experience. Metaphors may help players to make sense of their own gameplay experiences and assist when telling others about it. A player-narrative metaphor can be effective when conveying a *Tetris* gameplay experience to others without having to describe each gameplay individually.

From an aesthetical perspective, graphically abstract computer games are commonly characterized as metaphorical, whereas games with photo-realistic graphics and depictions of characters and events are regarded as simulations (Möring *Games and Metaphor* 2013; Möring “Metaphor-Simulation” 2013). The game *The Marriage* (2007) is considered metaphorical (Juul 2007; Rusch 2009; Bogost 2011) because it mimics the dynamics of a couple’s love relationship, with both partners depicted as squares of changing sizes, opacity, and location, depending on the player's success in caring for the relationship. At the same time, playing a love relationship in *The Sims 3* (2009) would be identified as a simulation of love because the game is widely considered a life simulation. Both metaphor and simulation are—contrary to popular belief—simultaneously characterized by the similarity and dissimilarity between the *source system* and *target system* of simulation as well as the *source domain* and the *target domain* of metaphor. Their existence as both simulation and metaphor create this similarity and dissimilarity in the first place, and, thus, definitions of simulations and metaphors share significant similarities. *Metaphor* is defined as "a device for seeing something in terms of something else. It brings out the *thisness* of a *that*, or the *thatness* of a *this*" (Burke 1941, 421–422). And "to simulate is to model a (source) system through a different system" (Frasca 2003, 223). However, cognitive metaphor theory allows understanding of the similarity of the underlying metaphorical model of love in both cases, *The Marriage* and *The Sims 3* (Möring 2015). Although the games are visually dissimilar, they both model love in terms of a general cognitive model of love that is metaphorically structured.

The concept of metaphor has found some prominence among game designers, who often develop specific schemes of interaction around a metaphor. This could be the mapping of movements of game characters onto game controllers in sports games or action-adventure games, allowing users to cognitively connect the input hardware they use with a game's on-screen action (Kayali and Purgathfer 2008). Interface metaphors and mental models are established concepts in the field of interaction design, which has a strong influence on game design.

Analogous to poetry and the arts, metaphor is an effective means of expression among designers of art games and those who subscribe to the paradigm of proceduralism, which is the way art games express meaning, as opposed to persuasive games, which apply procedural rhetoric (Bogost 2011). *The Marriage*, often identified as metaphorical, is also an art game, and according to its author, Rod Humble, "intended to be art" (Humble 2006). The same goes for Jason Rohrer's game *Passage* (2007), which is simultaneously interpreted as a "very abstract metaphor . . . for the human condition" (Dahlen 2010) and applying proceduralism (Bogost 2011).

Some authors find that most metaphorical readings of games interpret them in terms of existential metaphors such as the human condition, death, life, work, and love. They argue that it is not because game designers applied proceduralism to achieve a metaphorical expression of their game but because the computer game's form is itself existential, and it is the choice of the medium that gives rise to such existential metaphorical readings (Möring *Games and Metaphor* 2013). Other authors, such as Doris Rusch, oppose this idea and argue that it is possible to design meaningful games by leveraging myth and ritual and experiential metaphors (Rusch 2018, 2017). Experiential metaphors create "an analogy between gameplay and real-life experience evoked by what the moment-to-moment gameplay feels like, whether these analogies were intended by the designers or not" (Rusch 2017, 74). To Rusch, the grappling hook sequence in *God of War II* (2007) is an experiential metaphor for the existential experience of transition, which is described as "letting go and moving on" (Rusch 2017, 75). In a similar spirit, Sabine Harrer investigates game design as a therapeutic method to help people deal with experiences of loss and grief by applying "metaphorical modelling" (Harrer 2018, 196). As a result, grieving mothers design game worlds, characters, and events that help them express their feelings regarding their loss.

Sebastian Möring

See also: Art; Game Design; Rhetoric

Further Reading

Bogost, Ian. *How to Do Things with Videogames*. Kindle edition. Minneapolis: University of Minnesota Press, 2011.

Burke, Kenneth. "Four Master Tropes." *Kenyon Review* 3, no. 4 (1941): 421–438.

Dahlen, Chris. "AVC at GDC '10: An Interview with Art-Game Creator Jason Rohrer." In *AV Club* (blog), 2010. Available at http://www.avclub.com/articles/avc-at-gdc-10-an-interview-with-artgame-creator-ja,39180/.

Frasca, Gonzalo. "Simulation versus Narrative: Introduction to Ludology." In *The Video Game Theory Reader*, edited by Mark J. P. Wolf and Bernard Perron, 221–235. New York and London: Routledge, 2003.

Harrer, Sabine. *Games and Bereavement: How Video Games Represent Attachment, Loss and Grief*. Bielefeld, Germany: Transcript Verlag, 2018.

Humble, Rod. "The Marriage" (website). 2006. Available at http://www.rodvik.com/rodgames/marriage.html.

Juul, Jesper. "A Certain Level of Abstraction." In *Situated Play: Proceedings of DiGRA 2007 Conference*, 510–515. 2007. Available at http://www.digra.org/dl/db/07312.29390.pdf.

Kayali, Fares, and Peter Purgathofer. "Two Halves of Play—Simulation versus Abstraction and Transformation in Sports Videogames Design." *Eludamos* 2 (March 2008): 105–127.

Möring, Sebastian. *Games and Metaphor—A Critical Analysis of the Metaphor Discourse in Game Studies*. Copenhagen, Netherlands: IT University of Copenhagen, 2013. Available at http://bit.ly/1Gtcg4k.

Möring, Sebastian. "The Metaphor-Simulation Paradox in the Study of Computer Games." *International Journal of Gaming and Computer-Mediated Simulations* 5, no. 4 (2013): 48–74. Available at https://doi.org/10.4018/ijgcms.2013100103.

Möring, Sebastian. "Simulated Metaphors of Love. How the Marriage Applies Metaphors to Simulate a Love Relationship." In *Game Love: Essays on Play and Affection*, edited by Jessica Enevold and Esther MacCallum-Stewart, 196–215. Jefferson, NC: McFarland & Co., 2015.

Murray, Janet. *Hamlet on the Holodeck: The Future of Narrative in Cyberspace*. Cambridge, MA: The MIT Press, 1997.

Rusch, Doris C. *Making Deep Games: Designing Games with Meaning and Purpose*. Boca Raton, FL: CRC Press, 2017.

Rusch, Doris C. "Mechanisms of the Soul—Tackling the Human Condition in Videogames." In *Breaking New Ground: Innovation in Games, Play, Practice, and Theory*. Uxbridge, UK: Brunel University, 2009. Available at http://www.digra.org:8080/Plone/dl/db/09287.01371.pdf.

Rusch, Doris C. "21st Century Soul Guides: Leveraging Myth and Ritual for Game Design." In *DiGRA Nordic '18: Proceedings of 2018* International *DiGRA Nordic* Conference, 1–13. November 2018.

Metatextuality

Metatextuality describes the ability of video games to be able to refer to their own status as systems of signs and rules. Thinking about metatextuality in video games might immediately raise the question as to how far they can be understood as texts. In a broad cultural studies sense, a text can be defined as "any organized set of discourses (and meanings)" (Lewis 2008, 403) or, slightly more specifically, as "a group of entities, used as signs, which are selected [and] arranged . . . to convey some specific meaning" (Gracia 1995, 4). Accordingly, *meta*textuality indicates ways in which video games refer to their own status as mediated, as artifacts, as constructed, or as systems of signs—in other words, a video game knowing and displaying that it is a video game.

Metatextuality exists next to similar terms, such as *metareference* and *metafictionality*, and related concepts, such as self-reference, self-reflexivity, and self-awareness. In the most general sense, following Wolf (2008), metareference can be seen as a "special variant" (303) of self-reference, one that "always implies an awareness of the medial status of the work or system under consideration" (306). Meta*textuality*, in turn, highlights a game's awareness as part of a larger and complex system of signs, pointing to the ludic, simulational, narrative, and fictional elements, among others, that make up how a video game can be understood as a kind of text. More detailed (often narratological) terminological differentiations between these concepts have previously been discussed (cf. Wolf [2008]; Nöth [2008]), whereas the functions and effects of (and reasons for) the use of metatextuality in video games have received comparatively little attention. In fact, in contrast to the prominence of metatextual elements in video games, the subject has been relatively rarely studied so far, unlike media forms such as the novel (cf. Waugh [2002]; Currie [2014]) or the medium of film (cf. Stam [1992]; Ames [2015]).

To understand the variety in which video games feature metatextuality, it is useful to further specify it in two ways. The first concerns the realization that metatextuality is not a binary characteristic—it is not a question of a video game either being metatextual or not—but a matter of degree (cf. Waugh 2002, 14; Nöth 2008, 13; Wolf 2008, 304), something that video games can engage in, with one game potentially being more metatextual than another. As Wolf notes, "'metareference' is first and foremost applicable to individual phenomena within certain works ('metaelements'). Yet, if metaphenomena become salient features of a work as a whole, one may speak . . . of a 'metatext'" (307). In *Max Payne* (2001), for instance, a dream sequence has the main character explicitly state that "[he] was in a computer game," a metatextual realization that is explained by the drugged-up status of the protagonist (Walther 2008, 233–234). In contrast, games such as *The Beginner's Guide* (2015) and *Pony Island* (2016) insist on an engagement with their status as fictional games as the core premise of the playing experience. This degree can thus also be influenced by a specific metatextual reference being (more or less) explicit, only being hinted at, or having to be interpreted and inferred (Jannidis 2009, 546).

Second, because video games are such complex systems of signs, they can implement metatextuality in regard to different elements of their textuality. Previous studies have included systematizing efforts for some of these aspects (cf. Walther [2008]; Santaella [2008]; Carrasco and Tosca [2016]), yet these largely differ according to scholars' ontological understanding of video games. In a most general sense, all video games are inherently self-aware and self-referential, "since playing and games create their own self-referential worlds apart from the world of referential facts and realities" (Nöth 2008, 13; cf. also Walther 2008) and since "the rules of a game *generally* refer back to the game as a game" (Rapp 2008, 255). However, beyond this aspect, video games can also exhibit more "*explicit* forms" (Rapp 2008, 255) of metatextuality. These different forms and ways in which metatextuality can be implemented often intersect and overlap.

One kind of metatextuality concerns video games' rules, for instance, when part of a tutorial is addressed simultaneously to the protagonist and the player, as in games such as *Zork* (1977) and *Metal Gear Solid* (1998) (Neitzel 2008, 244–249). Another kind relates to video games' fictional worlds, in which "images, texts, films, or spoken language" (Jannidis 2009, 545) can explicitly include a reference to the game as an artifact, as in *Max Payne* or *Pony Island*. A game within a game, such as *Day of the Tentacle* (1993), which features a playable copy of its predecessor, *Maniac Mansion* (1987), accessed through a computer in the game (Rapp 2007, 260), exemplifies a combination of both rule-based and fictional metatextual elements. Moreover, metatextuality can refer to a variety of (extratextual) aspects that form part of the playing experience, such as the specific (fictional) game itself, its materiality (i.e., the hardware), the act of playing, the presence of the player, or video games and playing in general, among others.

Many of the strategies with which video games implement metatextuality have been remediated (cf. Bolter and Grusin [2003]) from older media, such as metalepsis, mise-en-abyme, or the breaking of the "fourth wall," which are usually adapted to fit the specifics of the video game medium (Carrasco and Tosca 2016, 34). Intertextual references, including those to a game's genre or to other media (Jannidis 2009, 544), can also (but do not have to) lead to metatextuality, for instance, in a game such as *Alan Wake* (2010), whose frequent references to novels, films, and TV series also highlight its own mediality as a game along with its efforts to engage in transmedial storytelling (cf. Thon 2016).

The functions and effects of metatextual elements in video games vary and have changed over time. While existing studies often cite humor or entertainment (Carrasco and Tosca 2016, 33; Jannidis 2009, 557) as primary functions, this might be particularly applicable only to singular metatextual instances in video games, including so-called Easter eggs (Jannidis 2009, 546). More thoroughly, metatextual games exude more complex pleasures as well, such as an interest in "operational aesthetics," that is, a pleasure inherent in the formal aspects of a game instead of just its content, with players "watch[ing] the gears at work, marveling at the craft" (Mittell 2015, 43). All of these functions highlight that metatextuality also centrally depends on being recognized by players (Wolf 2008, 307), rather than only being a static element of a video game. Additionally, some contemporary video games use their metatextual elements to probe their inner workings (Schubert 2019). For instance, *The Stanley Parable* (2013) is essentially about the difficulties of narrating a linear story in a video game balanced against the expectations of agency on the side of players (Fest 2016), reflecting parts of the central debate between *ludologists* and *narratologists* in early game studies. Similarly, both *BioShock* (2007) and *BioShock Infinite* (2013) feature metatextual narrative elements that point out the inherent lack of "freedom" of choice players have had while playing these games (Jannidis 2009, 560–561; Schubert 2015). Comparable to metafiction that "pose[s] questions about the relationship between fiction and reality" (Waugh 2002, 2), such sophisticated metatextual engagements thus highlight core questions about the nature of video games.

Overall, *metatextuality*, as an umbrella term, captures the different ways in which video games can highlight their own constructedness. Researching metatextuality in video games seems particularly productive when examining the different ways in which games can refer to themselves as systems of signs while acknowledging metatextuality as a gradable concept. As video games continue to increasingly experiment with their form, probing more deeply into the poetics and the cultural work of their metatextual elements, both theoretically and in individual case studies, appears to be a promising avenue for future studies.

Stefan Schubert

See also: Metagames; Metalepsis; Video Games within Video Games

Further Reading

Ames, Christopher. *Movies about the Movies: Hollywood Reflected*. Lexington: University Press of Kentucky, 2015.

Bolter, Jay David, and Richard Grusin. *Remediation: Understanding New Media*. Cambridge, MA: MIT Press, 2003.

Carrasco, Silviano, and Susana Tosca. "Meta-Literacy in Gameworlds." *Anàlisi* no. 55 (2016): 31–47. Available at https://doi.org/10.7238/a.v0i55.2936.

Currie, Mark, ed. *Metafiction*. London: Routledge, 2014.

Fest, Bradley J. "Metaproceduralism: The Stanley Parable and the Legacies of Postmodern Metafiction." *Wide Screen* 6, no. 1 (September 2016). Available at http://widescreenjournal.org/index.php/journal/article/view/105.

Gracia, Jorge J. E. *Theory of Textuality: The Logic and Epistemology*. Albany, NY: SUNY Press, 1995.

Jannidis, Fotis. "Metareference in Computer Games." In *Metareference across Media: Theory and Case Studies*, edited by Werner Wolf et al., 543–565. Amsterdam, Netherlands: Rodopi, 2009.

Lewis, Jeff. *Cultural Studies*. Los Angeles: Sage, 2008.

Mittell, Jason. *Complex TV: The Poetics of Contemporary Television Storytelling*. New York: NYU Press, 2015.

Neitzel, Britta. "Metacommunication in Play and in (Computer) Games." In *Self-Reference in the Media*, edited by Winfried Nöth and Nina Bishara, 237–252.

Berlin, Germany: de Gruyter, 2008.

Nöth, Winfried. "Self-Reference in the Media: The Semiotic Framework." In *Self-Reference in the Media*, edited by Winfried Nöth and Nina Bishara, 3–30. Berlin, Germany: de Gruyter, 2008.

Rapp, Bernhard. "Self-Reflexivity in Computer Games: Analyses of Selected Examples." In *Self-Reference in the Media*, edited by Winfried Nöth and Nina Bishara, 253–265. Berlin, Germany: de Gruyter, 2007.

Santaella, Lucia. "Computer Games: The Epitome of Self-Reference." In *Self-Reference in the Media*, edited by Winfried Nöth and Nina Bishara, 207–218. Berlin, Germany: de Gruyter, 2008.

Schubert, Stefan. "Narrative and Play in American Studies: Ludic Textuality in the Video Game *Alan Wake* and the TV Series *Westworld*." In *Playing the Field: Video Games and American Studies*, edited by Sascha Pöhlmann, 113–129. Berlin, Germany: de Gruyter, 2019.

Schubert, Stefan. "Objectivism, Narrative Agency, and the Politics of Choice in the Video Game *BioShock*." In *Poetics of Politics: Textuality and Social Relevance in Contemporary American Literature and Culture*, edited by Sebastian M. Herrmann et al., 271–289. Heidelberg, Germany: Winter, 2015.

Stam, Robert. *Reflexivity in Film and Literature: From Don Quixote to Jean-Luc Godard*. New York: Columbia University Press, 1992.

Thon, Jan-Noël. *Transmedial Narratology and Contemporary Media Culture*. Lincoln: University of Nebraska Press, 2016.

Walther, Bo Kampmann. "Self-Reference in Computer Games: A Formalistic Approach." In *Self-Reference in the Media*, edited by Winfried Nöth and Nina Bishara, 219–236. Berlin, Germany: de Gruyter, 2008.

Waugh, Patricia. *Metafiction: The Theory and Practice of Self-Conscious Fiction*. London: Routledge, 2002.

Wolf, Werner. "Metafiction and Metamusic: Exploring the Limits of Metareference." In *Self-Reference in the Media*, edited by Winfried Nöth and Nina Bishara, 303–324. Berlin, Germany: de Gruyter, 2008.

Metroid Series

Metroid is a single-player action-adventure game for the Nintendo Entertainment System (NES)/Family Computer. Released in August 1986 in Japan, August 1987 in North America, and January 1988 in Europe, it is the first game in Nintendo's *Metroid* series. It was designed by Yoshio Sakamoto and Hirofumi Matsuoka and was developed by Nintendo's famed Research and Development 1 (R&D1) division under the supervision of Gunpei Yokoi.

The game's backstory, inspired by Ridley Scott's *Alien* (1979), revolves around the titular metroids, mysterious life-forms endowed with highly destructive capabilities. Transported to Earth on board a Space Federation research vessel, the metroid specimens are captured by pirates and taken to planet Zebes. There, in the safety of their fortress, the pirates proceed to replicate the creatures with the intention of using them as a biological weapon. Following an unsuccessful assault on the planet, the Space Federation dispatches a lone warrior, cybernetically enhanced bounty hunter Samus Aran, to infiltrate the pirate stronghold and eliminate the threat.

Metroid's gameplay focuses on exploration and combat, as the player navigates the sprawling underground fortress, fighting assorted enemies along the way. The game takes cues from Nintendo's successful earlier titles, combining side-scrolling platform-based design popularized by the seminal *Super Mario Bros.* (see *Mario* Series) with the open-ended world and nonlinear progression of *The Legend of Zelda* (see *Legend of Zelda, The* Series). Unlike typical platform games of the time, which forced the player to traverse the world from left to right, one level at a time, *Metroid* allows movement in all directions. Its labyrinthine map, combining horizontally and vertically oriented areas, is designed with free-form exploration and backtracking in mind: scattered around the pirate fortress are a number of upgrades for Samus's combat suit. The player must locate and collect these permanent power-ups to reach previously inaccessible areas and progress in the game.

In addition to its intricate map design, *Metroid* has often been praised for its somber and claustrophobic atmosphere (especially compared with earlier NES titles), and Hirokazu Tanaka's haunting musical score. The game is also notable for its protagonist, bounty hunter Samus Aran. Created by Makoto Kanom and designed by Hiroji Kiyotake, she is one of the first video game heroines. Interestingly, her gender is not immediately obvious. The Japanese and English instruction manuals consistently refer to Samus using non-gender-specific and masculine pronouns, respectively, and her bulky armor suit makes it all but impossible to determine whether the character is even human. Her true identity is only revealed once the game is completed in less than five hours, whereupon she removes her helmet, displaying a mane of long, auburn hair. The inclusion of multiple endings, dependent on the time and degree of completion (items collected, secrets found, etc.), has since become one of the staples of the series.

Nintendo GAME BOY™
METROID®
RETURN OF SAMUS TM/MC
DMG-APAE-USA
THIS SIDE OUT
Nintendo

The cartridge for *Metroid II* for the Nintendo Game Boy. (Michel Bussieres/ Dreamstime.com)

The game was originally developed for the Nintendo Family Computer Disk System—an external floppy disk drive that plugged into the Famicom cartridge port. Taking advantage of the rewritable medium, this version could save up to three games to the disk. In the cartridge-based conversion, released in 1987, this functionality was replaced with a password system, allowing users to resume play from a specific point.

The *Metroid* series is one of Nintendo's longest-running and most profitable franchises. The first game was followed by three direct sequels, *Metroid II: Return* *of Samus* (Nintendo Game Boy, 1991), *Super Metroid* (Super Nintendo Entertainment System [SNES], 1994), and *Metroid Fusion* (Game Boy Advance, 2002), all developed by Nintendo's R&D1. In the early 2000s, the *Metroid* license was offered to the American developer Retro Studios. In a controversial but ultimately highly successful move, Retro departed from *Metroid*'s two-dimensional roots, creating instead a trilogy of first-person action adventures: *Metroid Prime* (Nintendo GameCube, 2002), *Metroid Prime 2: Echoes* (Nintendo GameCube, 2004), and *Metroid Prime 3: Corruption* (Nintendo Wii, 2007). In 2009, all three games were rereleased as *Metroid Prime Trilogy* (Nintendo Wii). The limited edition compilation included new versions of *Prime* and *Echoes*, featuring updated graphics, motion control, and support for wide-screen televisions. The next entry in the series, *Metroid: Other M* (Nintendo Wii, 2010), was developed by Team Ninja (of the *Ninja Gaiden* fame). Drawing on the two strands of the franchise's history, it combines third- and first-person perspective gameplay. A series spin-off, *Metroid Prime: Federation Force* (2016), was a four-player game released for the Nintendo 3DS, and in June of 2017, *Metroid Prime 4* was announced for the Nintendo Switch. An enhanced remake of the original game was released in 2004 for the GameBoy Advance under the title *Metroid: Zero Mission*.

P. Konrad Budziszewski

See also: Gender; Time

Further Reading

Hunt, Stuart. "The Complete History of *Metroid*." *Retro Gamer* 65 (2009): 26–33.

McLaughlin, Rus. "The History of Metroid." IGN. Available at https://www.ign.com/articles/2008/08/15/ign-presents-the-history-of-metroid.

Metroid Database. Accessed October 3, 2020. Available at http://www.metroid-database.com.

Wikitroid: The Metroid *Wiki*. Accessed October 3, 2020. Available at https://metroid.fandom.com/wiki/Metroid_Wiki.

Mexico

Mexico is a video game giant; as of late 2018, the industry boasts a market value of $1.07 billion and a player base of forty-four million Mexicans, over a third of the population. Video games and Mexico have always had a loving relationship. In the early days, when there was no legal way to acquire consoles, a gray market for illegally imported home *PONG* consoles and arcade machines blossomed. For a while, there was even a bootleg version of *PONG* (1972), called *NESA-PONG*, developed by local engineer Morris Behar.

In the 1980s, the first legal shipment of Atari consoles arrived in Mexico, and during that decade, the market saw the greatest growth, as did the arcade scene. The market was big enough for companies such as Capcom, SEGA, and SNK to open local offices in the country; the influence of those days is still felt throughout all of Mexico, with the *Street Fighter* and *The King of Fighters* series remaining some of the most popular games in the country, and it is not uncommon to even find arcade cabinets in rural areas.

In 1985, the Nintendo Entertainment System (NES) launched, but due to its high price tag, it was inaccessible to most Mexicans; but thanks to the work of Teruhide Kikuchi, Nintendo soon exploded in popularity in the country. Kikuchi worked for C. Itoh, the official Nintendo distributor in the region; he opened up Mundo Nintendo ("Nintendo World") retail stores, where players could try out the latest releases, and he spearheaded initiatives such as the *Club Nintendo* magazine and the *Nintendo Maniacos* TV show. Through these initiatives, Kikuchi drilled the Nintendo brand into Mexican popular culture to the point that, even today, a lot of people refer to any video game console as a "Nintendo." And if you could not afford an NES console, you could afford a magazine or watch the TV show and be part of the Nintendo community in the country.

Through the life cycles of the NES, SNES, and Nintendo 64, Nintendo dominated the video game market, but the time came when audiences started asking for more mature experiences, and it was through the PlayStation 2 (PS2) that Sony managed to get a foothold in the Mexican market. The PS2 was the Mexican champion of the sixth-generation consoles, but with a heavy marketing push, the opening of local offices, and the huge *Gears of War* and *Halo* communities that started brewing in the country, the crown was stolen by Microsoft during the seventh generation of consoles: the Microsoft Xbox 360 was the most popular console of those years.

While Mexico has been a giant in video game consumption, game development has been more of a struggle. There have been many attempts to kick-start an industry in the country, but the results have been mixed. This industry has always been ignored by the government, and even when little support has come its way, it has been lost due to corrupt processes that end up assigning funds to the friends or family of the government official in charge of the funds. The goal of creating a Mexican video game development industry has always been in the hands of the fans.

For the first serious game developers in the country, it all started with *Club Nintendo* #44, an issue that included a report on Digipen. This was the first time that fans realized their hobby could be also a career. The first formal game studios in Mexico were Aztec Tech Games (founded in 1998), Evoga (founded in 2000), and Radical Studios (founded in 2000). Evoga did art outsourcing for SNK, and both Aztech Tech and Radical Studios worked on games that never saw the light of day; however, their experience would help the next generation of game developers to avoid their mistakes.

The next big studio in the country was Sabarasa, founded in 2009. The studio worked with licenses and managed to ship games based on huge Mexican intellectual properties (IPs) such as "Atrevete a Soñar" and "El Chavo del Ocho." The studio tanked when its biggest investment, a *lucha libre* title based on the AAA Mexican league, tanked.

Today, the Mexican independent industry is at its highest point so far, and still without government support. Studios such as Bromio, HyperBeard, and Lienzo have managed to create sustainable businesses through the creation of original IPs.

Bromio grew up in the mobile game market with games such as *Take Your Time* (2014) and *Mighty Swiping Shiba Force* (2015), but it really struck gold when it launched a successful Kickstarter campaign for *Pato Box* (2018), a spiritual successor of *Punch-Out!!* (1984) with a crime noir narrative that goes to unexpected places. It was declared Indie Game of the Year by Goichi Suda (known by the nickname “Suda51”) in his monthly *Dengeki* magazine column.

Lienzo is another studio that found its claim to fame through Kickstarter, successfully finding funding for *Mulaka* (2018), a *Zelda*-like game where you play as a Tarahumara (a group of indigenous people living in the state of Chihuahua in Mexico). The game is both a fantastic, fun, and engaging video game and a digital artifact of immense cultural value for the Tarahumara culture.

Another great example of Mexican creativity and success is HyperBeard studios, a mobile game developer with years of experience. The studio is mostly known for *Kleptocats* (2018), without a doubt the most successful new Mexican IP of recent years. The franchise has animated shorts, two games, a book, and a merchandising deal with toy company Funko.

As long as the government continues to ignore the industry, it will be hard to create a sustainable infrastructure; however, small developers are starting to find success in the country, and a new generation of games is about to come out. *Broken Reality*, *Design Hero*, and *Neon City Riders* are examples of Mexican creativity with international appeal. The Mexican indie game development community has never been as vibrant nor successful as it is today. If these brave warriors keep on moving forward, the day when the country has a sustainable industry may come soon.

Humberto Cervera

See also: Latin America; Latinos and Video Games

Further Reading

Cervera, Humberto, and Jacinto Quesnel. “Mexico.” In *Video Games around the World,* edited by Mark J. P. Wolf, 345–357. Cambridge, MA: MIT Press, 2015.

MicroProse

MicroProse was a prominent developer and publisher of computer games in the 1980s and 1990s, releasing long-running franchises such as *Civilization*, *X-Com*, and *Master of Orion*. Businessman J. W. “Wild Bill” Stealey and game designer Sid Meier were employees at electronics company General Instruments when they founded the game company in 1982 as a side venture. The well-propagated founding myth is that Meier, a rather reserved programmer, caught the attention of Stealey, a colorful former fighter pilot, in an arcade gameplaying session in which the former won not through reflexes but by noting the game’s predictable artificial intelligence (AI) patterns. In more in-depth interviews, Meier has presented a somewhat less dramatic account, but it is a good characterization of the two’s partnership. Stealey was the flamboyant promoter and managed all the business decisions, and Meier was the low-key game-making genius.

All of the company's offerings in the 1980s, such as *F-15 Strike Eagle* (1984), *Silent Service* (1985), and *Gunship* (1986), were focused on the new and steadily growing home computer market. Within a year of its founding, the company was successful enough that the cofounders quit their positions at General Instruments. MicroProse expanded into the distribution of other developers' games and also focused on European markets, an unusual emphasis in the early American computer game industry. Eventually, the company had development studios in Chipping Sodbury, England; Alameda, California; Chapel Hill, North Carolina; and Hunt Valley, Maryland. In the early 1990s, Stealey decided to invest in arcade games and console-based games. Meier was uncomfortable enough with these moves that he sold his stake in the company to Stealey but continued to work as a contracted game designer. The combination of the risky new ventures and the recession of the early 1990s put MicroProse in financial trouble, leading to an initial public offering (IPO) to raise cash. This did not solve the problems, and in 1993, Stealey persuaded Spectrum Holobyte to purchase MicroProse.

The change in management caused discontent and led to a series of departures by key personnel. In 1995, Bruce Shelley left, eventually founding Ensemble (maker of the *Age of Empires* series). In 1996, Sid Meier, Jeff Briggs, and Brian Reynolds left to found Firaxis, which went on to make *Sid Meier's Alpha Centauri* (1999) and the most recent editions of *Civilization* (*Civilization III* in 2001, *Civilization IV* in 2005, *Civilization V* in 2014, *Civilization VI* in 2016, and *Revolution* in 2007), *Sid Meier's Pirates* (2004), and *Sid Meier's Railroads* (2006), among other titles. With these changes and the acquisition of MicroProse/Spectrum Holobyte by Hasbro Interactive in 1998, the traditional identity of the company effectively disappeared. French game industry giant Infogrames purchased Hasbro Interactive in 2001, which ended the existence of MicroProse as a label. Some of the studios distributed by MicroProse lasted a few more years, but these eventually shut down as well.

MicroProse was an important force in video game history because of the well-known games it created and the influential people who worked for it. In its early days, the company focused on military simulations—either arcade-style, such as *Gunship* (1986), or strategic map-style, such as *NATO Commander* (1983)—which sold well but were neither huge hits nor deeply influential. The 1987 release of *Sid Meier's Pirates* was both a significant success and departure in style because it was a kind of role-playing game (RPG); it also marked the first use of Meier's name as a marketing tool. Meier and Shelley continued to develop outside the purely military theme with *Railroad Tycoon* (1990) and the blockbuster hit *Civilization* (1991). Although Stealey was more interested in the purely militaristic games, it was the empire building strategy games that became the distinctive hallmark of MicroProse in the 1990s, such as *Colonization* (1994), *Masters of Magic* (1994), and *Masters of Orion* (1995). Other prominent series include the tactical battle *X-COM* games (developed by Mythos Games) and a wide range of flight sims, such as the *Stealth Fighter*, *Gunship*, and *Falcon* games.

Many MicroProse employees went on to successful careers elsewhere. In addition to Meier, the list includes Bruce Shelley, designer of *Age of Empires* (1997); Brian Reynolds, cofounder of Firaxis Games and later Big Huge Games; and Jeff Briggs, cofounder of Firaxis Games. Dan Bunten, the designer of *Seven*

Cities of Gold (1984) and *M.U.L.E.* (1983), also worked for MicroProse for a few years.

Kevin Schut

See also: Meier, Sid

Further Reading

Brown, Fraser. “The History of the Strategy Game.” *PC Gamer*, December 24, 2018. Available at https://www.pcgamer.com/the-history-of-the-strategy-game/.

DeMaria, Rusel, and Johnny L. Wilson. *High Score! The Illustrated History of Electronic Games*. Berkeley, CA: McGraw-Hill/Osborne, 2002.

MobyGames. “MicroProse Software, Inc.” Accessed October 3, 2020. Available at http://www.mobygames.com/company/MicroProse-software-inc.

Microsoft Studios. *See* Xbox Game Studios

Microsoft Xbox

The Xbox is a sixth-generation console produced by Microsoft. The console was first announced in 1999 and was released in November 2001 in North America and early 2002 in other markets. The Xbox was the first game console to be entirely produced by Microsoft. It takes its name from the DirectX software package developed for the use of multimedia (particularly games) on the various Microsoft Windows platforms. After the seventh-generation Microsoft Xbox 360 was released in November 2005, the original Xbox was discontinued in 2005, and new software was gradually phased out of production; the last title was released in 2008.

The Xbox featured a significant number of technical innovations: a Pentium III microprocessor, graphics and sound processors codeveloped in a troubled partnership with graphics specialists Nvidia (the partners were involved in a legal dispute over the pricing and supply in 2002–3), an 8-gigabyte hard drive, and an Ethernet connection for LAN and online play. From November 2002, its internet connectivity was supported by the Xbox Live service, which allowed software and updates to be downloaded directly to the Xbox and stored on its hard drive. The Xbox Live service supported downloadable content and online multiplayer access for Xbox games until April 2010. Xbox Live subscribers had either a Silver membership (free but limited access) or a Gold membership (fee-paying but full access). Games and downloadable content were purchased with Microsoft Points, which could be added to a subscriber’s account through store-bought prepaid cards or online via credit card. The service allowed for the publication of download-only games through the Xbox Live Arcade.

This service proved popular, with more than three million games purchased by February 2006. Bizarre Creation’s *Geometry Wars* (2003), originally included as a minigame in *Project Gotham Racing 2* (2003), was made available for individual download and became the Xbox Live Arcade's most popular title. Other popular downloadable games were puzzle games such as PopCap Games' *Bejeweled 2 Deluxe* (2005) and various repackaged arcade games from the 1970s and 1980s. By 2007, Xbox Live was available in twenty-six countries, primarily in North America (including Mexico), Western Europe, Scandinavia, and select parts of the Asia-Pacific: Australia, India, Japan, Singapore, New Zealand, South Korea, and Taiwan.

Like the Sony PlayStation 2 (PS2), the Xbox has an internal DVD-ROM drive, although it could not be used to view DVDs without the additional purchase of a separately packaged, specialized DVD remote. The DVD-ROM drive was used to play games or music, the latter of which could also be stored on the hard drive in MP3 format. This feature was explored in a number of games—including the launch title, Indie Built's *Amped: Freestyle Snowboarding* (2001)—that allowed songs stored on the hard drive to be used as the game's soundtrack. The original Xbox retail package also came with a single controller, which, as of 2019, is the bulkiest controller released for a console system. This controller was widely criticized and eventually replaced with a smaller, lighter controller that had originally only been included in the Japanese Xbox retail package.

The Xbox console developed a considerable modding community, primarily to circumvent the digital rights management (DRM) systems that were built into the hardware and software of the console. Modders also experimented with developing other software for Xbox, including XBMC (Xbox Media Centre), which enabled the Xbox to act as the hub of a home entertainment system, and a port of Linux for Xbox that allowed the console to function like a desktop computer.

When the console was launched, Microsoft was criticized for the poor quality of several of the launch titles, particularly Adrenium Games' *Azurik: Rise of Perathia* (2001). Microsoft's successful acquisition in 2000 of game developer Bungie, who had developed successful games, including *Marathon* (1994), for the Macintosh computer in the 1990s, meant that the studio's next title, *Halo: Combat Evolved* (2001), would be an Xbox exclusive. The popularity of the game ensured the success of the Xbox, and the protagonist, Master Chief (voiced by Steve Downes), became the console's unofficial mascot. The importance of the game series to the console's fortune was cemented with the release of *Halo 2* (2004). Promoted by the celebrated alternate reality game (ARG) *I Love Bees* (42 Entertainment, 2004), *Halo 2* made more than $125 million in sales during its first twenty-four hours and went on to sell more than eight million units, becoming the best-selling title for the console.

By the time its production was discontinued, the Xbox had sold approximately twenty-four million units: sixteen million in North America, six million in Europe, and two million in Asia. It secured an impressive share of the local North American console market, overtaking Nintendo GameCube in sales and second only to the PS2. The Xbox also met with some success in Europe but did not do as well as anticipated in Japan. Initially, Microsoft had difficulty brokering deals with established software producers, which meant that in the first few years of the console's production, many key titles were released as PlayStation exclusives or the Xbox version was only released after considerable delay. However, the Xbox versions of a number of multiplatform franchises sold over a million units, including Grey Matter Interactive's *Call of Duty 2: Big Red One* (2005), Electronic Arts/Black Box's *Need for Speed: Underground 2* (2004), and Ubisoft Montréal's *Tom Clancy's Splinter Cell* (2002). A number of Xbox-exclusive titles also garnered commercial and critical success, among them *Halo: Combat Evolved*, *Halo 2*, and the role-playing games (RPGs) *Fable* (2004) and *Star Wars: Knights of the Old Republic* (2003).

Thomas H. Apperley

See also: Microsoft Xbox One; Microsoft Xbox 360

Further Reading

Huang, A. *Hacking the Xbox: An Introduction to Reverse Engineering*. San Francisco, CA: No Starch Press, 2003.

Takahashi, D. *Opening the Xbox: Inside Microsoft's Plan to Unleash an Entertainment Revolution*. Roseville, CA: Prima, 2002.

Microsoft Xbox One

The Xbox One is an eighth-generation console produced by Microsoft. The console was first announced in 2011 and was released in November 2013 in North America and most other markets. Notably, the Xbox One was released in China in September 2014. The name of the console was selected to be consistent with the branding and marketing of the device as an "all-in-one entertainment system."

The Xbox One was initially bundled with an updated version of the voice- and motion-activated Kinect, which had first been released in 2011 as an add-on for the Xbox 360. However, by 2014, a reduced-priced console without the Kinect was also available. As part of the "all-in-one" package, the Xbox One emphasized the integration of cloud computing, social networking, and livestreaming. The console provided a suite of recording and editing options as well as links to Twitch and other streaming services.

A streamlined Xbox One S was released in 2016, followed by the deluxe Xbox One X in November 2017. Both of these new versions of the Xbox One console had been updated to playback video and render games at 4K resolution.

Prior to the release of the Xbox One, a rumor circulated that it would be an "always on" system, and there was a great deal of consternation about what this suggested for digital rights management (DRM) on the system. On release, the game licensing scheme for Xbox One was elaborate and required all games to be bound to the user's Xbox Live account. Microsoft promoted this feature as "flexible," as it allowed people to access their games from any other Xbox One console. However, this also meant that each Xbox One would be required to connect to the internet once every twenty-four hours or all games would be disabled until it was reconnected. This DRM scheme was regarded very negatively by consumers. In response, Microsoft changed the Xbox One's DRM policy, particularly the need to connect to the internet, and also removed the requirement that the Kinect sensor always be active and connected. This later requirement had also become a flashpoint of concern for privacy advocates. In general, the focus Microsoft had placed on the multimedia capacities in the initial phases of the promotion of the Xbox One also drew negative attention from some consumers who expected the focus to be on games.

The Xbox One featured many innovations. For example, the Xbox Adaptive Controller, a special controller designed for users with disabilities, was released in 2018. The controller features two large, raised buttons and a series of connectors to which a variety of peripherals can be attached that replace the functions of the standard Xbox controller buttons. Another crucial innovation was the Kinect 2.0, a natural user interface sensor that allowed the console to be controlled through motion tracking and voice commands. The Kinect 2.0 could track up to six people simultaneously.

The Xbox One launch was accompanied by an updated and upscaled Xbox Live service that used over three hundred thousand servers. Xbox Live members now had access to cloud storage, which was available to save various media as well as games and save files. In 2016, social networking features were added. "Clubs" allows members to join groups focused on specific interests or games, and "Looking for group" (LFG) helps members locate other players for multiplayer games. Xbox Live members can feature recorded clips on their Xbox Live profile page. Most features initially required a Gold subscription to use, but since June 2014, Gold membership has no longer been required for basic services; instead, the subscription gave members access to a small collection of free games each month. Sociological studies of the Xbox Live environment raised considerable concerns about the lack of moderation in multiplayer environments, where harassment and hate speech against women, people of color, and genderqueer players were alarmingly common.

Xbox One games are physically distributed on Blu-ray discs and are also available as downloads through the Microsoft Store. The best-selling Xbox One game is 343 Industries' *Halo 5: Guardians* (2015), which has sold over five million copies. Other high-selling titles, each of which has shipped over a million copies, include Microsoft Studios' *Forza Motorsport 5* (2013), Mojang's *Minecraft: Xbox One Edition* (2014), Infinity Ward's *Call of Duty: Infinite Warfare* (2016), EA Vancouver's *FIFA 17* (2016), and Turn 10 and Massive Entertainment's *Tom Clancy's the Division* (2016). Also among the best-selling titles was the indie game *Cuphead* (2017) by StudioMDHR.

The Xbox One sold rapidly on release, selling over one million units in the first twenty-four hours it was available. More than forty-five million had been sold worldwide by the middle of 2019. Despite this, very few sales have been made in Japan (estimated at approximately fourteen thousand total sales).

Thomas H. Apperley

See also: Microsoft Xbox; Microsoft Xbox 360

Further Reading

Gray, K. L. "Deviant Bodies, Stigmatized Identities, and Racist Acts: Examining the Experiences of African-American Gamers in Xbox Live." *New Review of*

Hypermedia and Multimedia 18, no. 4 (2012): 261–276.

Sell, John, and Patrick O’Connor. “The Xbox One System on a Chip and Kinect Sensor.” *IEEE Micro* 34, no. 2 (March–April 2014): 44–53. Available at https://ieeexplore.ieee.org/abstract/document/6756701.

Microsoft Xbox 360

The Microsoft Xbox 360 is a seventh-generation home video game console. In development since early 2003, the system was officially unveiled during an MTV special event on May 12, 2005, and released in North America on November 22, 2005; in Europe on December 2, 2005; and in Japan on December 10, 2005. The second game system developed by Microsoft Corporation’s Entertainment and Devices Division, the 360 is a successor to the original Microsoft Xbox.

The console’s custom PowerPC-based “Xenon” central processing unit (CPU), designed and manufactured by IBM, is a triple-core processor, with each core operating at the speed of 3.2 GHz. Shared between the cores is 1 MB of on-die Level 2 cache memory. Graphics are handled by the 500 MHz ATI Xenos chip (also doubling as a northbridge). The system is equipped with 512 MB GDDR3 RAM, shared between the CPU and graphics processing unit (GPU). The Xbox 360 supports multichannel surround sound and wide-screen high-definition graphics, up to 1080p. Broadband connectivity is provided by the built-in 10/100 Ethernet adapter (or, for the S model, a built-in wireless network adapter). As the first high-definition (HD)-capable console on the market, the 360 set the unofficial standard for the current generation of HD gaming technology.

The Microsoft Xbox 360 console system. (Jovani Carlo Gorospe/Dreamstime.com)

A DVD-ROM drive is the system's primary mass storage device. An external HD DVD drive was introduced in November 2006 but was discontinued in early 2008, a few days after Toshiba's decision to cede the HD optical disk market to the competing Blu-ray format. An optional detachable hard disk drive can be used to store games, media files, and downloadable content. In the absence of a hard drive, memory cards need to be used to save game data and system settings. Since December 2008, the Xbox 360 Arcade units have been equipped with internal flash memory, eliminating the need for memory cards. Designed as a digital media hub, the Xbox 360 supports local playback and over-the-network streaming of multiple video, audio, and image formats.

The Xbox 360 was initially sold in two retail configurations, as a $299 Core system (equipped with a wired controller and a standard definition A/V cable) and a $399 Pro package (including a wireless controller, an HD A/V cable, a 20 GB hard drive, and a headset). By 2007, the lineup was expanded to include the black-cased Xbox 360 Elite (120 GB hard drive), and the entry-level Core model was replaced by the Xbox 360 Arcade. All these models were discontinued in 2010, following the release of the Xbox 360 S, which features updated internal architecture, expanded connectivity options (built-in wireless adapter, optical audio output, additional USB ports, and an auxiliary peripheral port that is used by the Kinect motion control sensor), and a redesigned, slimmer case. The Xbox 360 S is only available in two configurations: with a 250 GB hard drive or 4 GB of flash memory.

The system is partially backward compatible with the original Xbox games. This functionality is achieved through software emulation and requires the system to be equipped with a hard drive. Emulation profiles are available for approximately 50 percent of Xbox titles.

Online gaming is supported through Microsoft's Xbox Live subscription service. In addition to providing multiplayer and community features, the service also gives access to the Xbox Live Marketplace, a virtual market giving users access to paid and promotional content, including downloadable games, demos, and map packs as well as (through the Video Marketplace) movies and television show episodes.

Despite the one-year advantage, the Xbox 360 lost its initial market lead to the Nintendo Wii. By January 2011, the system was the second best-selling seventh-generation game console, with over fifty million units sold worldwide (Thorsen 2011), and by June 2014, eighty-four million units had been sold. The Xbox 360 was discontinued April 20, 2016, to make way for its successor, the Microsoft Xbox One.

P. Konrad Budziszewski

See also: Microsoft Xbox; Microsoft Xbox One

Further Reading

Bueno, Fernando, and Raymond M. Padila. *Xbox 360 Handbook: The Official User's Guide*. Roseville, CA: Prima Games, 2007.

Shippy, David, and Mickie Phipps. *The Race for a New Game Machine: Creating the Chips inside the Xbox 360 and the PlayStation 3*. New York: Citadel Press, 2009.

Takahashi, Dean. *The Xbox 360 Uncloaked: The Real Story behind Microsoft's Next-Generation Video Game Console*. New York: SpiderWorks, 2006.

Thorsen, Tor. "Xbox 360 Sells 50 Million, Kinect Ships 8 Million." GameSpot, January 5, 2011. Available at https://www.gamespot.com/articles/xbox-360-sells-50-million-kinect-ships-8-million-xbl-hits-30-million/1100-6285921/.

Middle East

The fast progress of video game culture in the 1970s and 1980s reached Middle Eastern markets at about the same time that it was spreading through households in Japan, the United States, and Europe. Early game consoles were popular in the region, and the senior generation still refers to all kinds of video games as "Atari" games, a result of the dominance of Atari VCS 2600 socially and commercially. Since the introduction of these game consoles and their succeeding 8-bit home personal computers, such as the Commodore 64 and the ZX Spectrum, the demand for video game consoles with an Arabic-friendly interface grew to a high level, encouraging Al-Alamyyeh, a Kuwaiti company, to start producing an Arabic home computer called the Sakhr (which means "rock" in Arabic) in 1981, which was essentially based on the well-known Japanese MSX. The product was a success and became popular with middle-class families in the Middle East.

During that time, Al-Alamyyeh made an attempt to convert the BASIC computer language into Arabic, and many applications were developed to support domestic users; but in general, the software industry in the region was essentially targeting the corporate applications market. Hardly any of these programs were Arabic video games, and the reason was obvious: no one would invest in a market flooded with cheap pirated games. Eventually, it was up to the Indie developers to start video game production, such as *War73* developed by Radwan Kasmiya in 1999, and Mohammed Hamza's *Stone Throwers* in 2001. Both were two-dimensional arcade-style games for personal computers and were based on Arab-Israeli conflicts.

The initial success and popularity of these titles stimulate local talents, yet getting investors was another challenge that was settled by bringing oil-rich GCC investments onboard. The first batch of Generation X entrepreneurs established few game studios in Syria, Lebanon, Jordan, and the United Arab Emirates (UAE).

Nevertheless, these studios were unable to depend on video games to survive; competition with international titles, piracy, and closed borders between countries of the Middle East were among the reasons that had forced the majority of these studios to shut down. Survivors had to rely on media production to float, which meant developing CG animations for regional TV channels; therefore, video games became secondary high-risk projects. Still, unique titles such as the *UnderAsh* series (FPS-PC, 2002), *Quraish* (RTS-PC, 2005), and localized titles such as *Arabic Rappelz* (Web-RPG, 2008) and *FIFA 2010* (EA, 2009) found their way to players and enjoyed massive success.

The sociopolitical events that led to the Arab Spring in 2010 put an end to that era, forcing fragile local studios out of business; however, the rise of freemium client and web-based online games (and mobile games later in 2013) was a dreamlike cure to distribution and piracy problems in Middle Eastern markets. Early adventurous Chinese companies enjoyed a massive success with games such as *Conquer Online* (ARPG, 2010) by NetDragon Websoft, and their business model was embraced by other Chinese companies. Slowly, it became a heated race to grab a slice of this promising market, where 60 percent of its online users are gamers and its growth rate of 25 percent year after year is the highest in the world. Eventually, regional developers found it beneficial to differentiate themselves in localization; new, culturally relevant content; and innovation. *Knights of Glory* (Web/Mobile SLG, 2011), by Falafel Games, was an example of such a rebirth, with two million installs in the region. Other games paved their way toward international recognition, such as *Pou* (Mobile Pet Game, 2012), by Paul Salameh, with more than five hundred million downloads (2019), and *Revenge of Sultans* (Mobile SLG, 2015), by Onemt, with more than USD 237 million of revenue. Other developers, such as WAFA Games, are trying to create new cross-platform strategy mobile games with *Swords of Glory* (2019), a crusader-themed strategy game bringing real-time strategy (RTS) gameplay to mobile devices through unique gameplay and innovative artificial intelligence (AI) technology.

Even though most success stories in the last ten years (as of 2018) come from mobile games, there are a few courageous independent developers from Egypt and Saudi Arabia who are trying to compete in console and hardcore games with games such as *Badiya* (2016) and *Knights of Light* (2019).

Radwan (RAD) Kasmiya

See also: Egypt; Jordan; Lebanon; *Quraish*; Saudi Arabia; Syria; United Arab Emirates

Further Reading

Falafel Games website. Accessed October 3, 2020. Available at http://www.falafel-games.com.

Kasmiya, Radwan. “Arab World.” In *Video Games around the World*, edited by Mark J. P. Wolf, 29–34. Cambridge, MA: MIT Press, 2015.

Revenge of Sultans website. Accessed October 3, 2020. Available at http://www.revengeofsultans.com.

Sisler, Vit. “In Videogames You Shoot Arabs or Aliens—Interview with Radwan Kasmiya.” *Umelec/International* 10, no. 1 (2006): 77–81. Available at http://uisk.jinonice.cuni.cz/sisler/publications/kasmiya.htm.

Midway Games

Midway Games, Inc., was an early American video game publisher and developer. The company developed notable titles such as *Mortal Kombat* (1992) and licensed many others, including Taito’s *Space Invaders* (1978) and Namco’s *Pac-Man* (1980). In 2009, Midway filed for Chapter 11 bankruptcy.

Midway Manufacturing was established in 1958. The company specialized in the manufacturing of amusement equipment, including pinball machines. It was purchased by Bally in 1969. In 1973, Midway became an early developer of arcade video games. Some of Midway's earlier titles include *Asteroid* (1973), *Paddle-Ball* (1973), *Ball Park* (1974), *Basketball* (1974), and *Gun Fight* (1975).

During the 1970s, Midway worked closely with Japanese game developer Taito, with both companies licensing each other's games to their respective countries. In 1978, Midway licensed and distributed Taito's *Space Invaders* to the United States, which proved to be a great success. In 1980, Midway followed with the release of two additional titles that also proved to be very successful, Williams's *Defender* (1980) and Namco's *Pac-Man*, which was so successful that Midway produced an unofficial sequel the following year, *Ms. Pac-Man* (1981). Midway continued to license arcade games throughout the 1980s, including titles such as *Galaga* (1981), *Joust* (1982), *Robotron 2084* (1982), *Tron* (1982), *BurgerTime* (1982), *Gauntlet* (1985), *Rampage* (1986), and *Xenophobe* (1987).

In 1988, Bally/Midway was purchased and reincorporated by Williams Electronics Games and its parent company, WMS Industries, Inc. Midway continued to produce arcade games under the Bally/Midway label, while producing pinball machines solely under the Bally name. In 1991, Midway absorbed Williams's gaming division and began marketing games without the Bally label. It was during this period that Midway published some of its most popular arcade titles, including *Terminator 2: Judgment Day* (1991), *Mortal Kombat* (1992), and *NBA Jam* (1993). In 1996, WMS acquired Time Warner Interactive, which included Atari Games. Midway changed its corporate name from Midway Manufacturing to Midway Games, Inc. This change also marked Midway's entrance into the home console market.

During this period of time, Midway began to experience financial losses. By 1998, WMS had sold its interest in Midway's stock, making Midway an independent entity. In 1999, Midway left the pinball industry to concentrate fully on video games. In 2001, Midway closed its arcade division due to loss of sales. In 2004, Midway began to purchase multiple independent video game studios in an attempt to strengthen its development teams. The studio's purchases included Surreal Software, Inevitable Entertainment, Paradox Development, and Ratbag Games.

Midway continued to face financial hardship, with the company losing millions of dollars in both 2006 and 2007. Afterward, the company began to finance its business with debt offerings. In February 2009, Midway filed for Chapter 11 bankruptcy. By May, Midway had received a takeover bid from Warner Bros. for approximately $33 million. On July 10, 2009, Warner Bros. purchased the majority of Midway's assets for $49 million. In August 2009, Midway's San Diego studio was purchased by THQ for $200,000. Midway's Chicago studio was rebranded NetherRealm Studios in April 2010. The studio is currently overseen by *Mortal Kombat* co-creator Ed Boon and is the primary developer of the *Mortal Kombat* and *Injustice* series of games.

Aaron D. Boothroyd

See also: Arcade Games; *Mortal Kombat*

Further Reading

NetherRealm Studios website. Accessed October 3, 2020. Available at https://www.netherrealm.com.

Schipper, Mark. "Seminal Chicago Video Game Studio Midway Games to Get the Documentary Treatment." *Chicago Reader*, August 18, 2015. Available at https://www.chicagoreader.com/Bleader/archives/2015/08/18/seminal-chicago-video-game-studio-midway-games-to-get-the-documentary-treatment.

Midwest Gaming Classic (MGC)

With its origins in a convention for fans of Atari's last console, the Atari Jaguar, the Midwest Gaming Classic (MGC) was cofounded by Dan Loosen, Gary Heil, and Marty Goldberg in 2001 in the basement of Milwaukee's Boy Scout Center. From those humble beginnings, it has grown to become one of the largest fan-based electronic entertainment trade shows in the United States, drawing large crowds domestically and internationally.

Loosen, Heil, and Goldberg first teamed up for the Jagfest 2K1 in Milwaukee, Wisconsin, where they opened the formerly closed Atari-only format to one more inclusive of the industry fan base. When Jagfest moved on to be hosted in another city the following year, they decided to keep the format going under Midwest Classic and expanded it further to include pinball as well. A formal name for the show was finally found after a contest to name it was held, with the winning name picked by future modding celebrity and fellow Wisconsin native Ben Heckendorn. The name change was accompanied by the final formula for the show: not intended to denote a retro orientation, the "Classic" in the title instead refers to the fact that any game can be considered a classic to someone. Whether released last week or thirty years ago, the games the MGC celebrates span the entire electronic entertainment industry, from past to present.

Currently organized as a two-day show staffed entirely by volunteers, the MGC features a unique combination of events, contests, industry speakers, vending, and more from four main areas: console-based games, computer games, arcade games, and pinball. Being so close to Chicago, once the Mecca of the pinball and arcade industry, the MGC is particularly known for its strong community support in the area, which regularly features more than two hundred pinball and coin-operated arcade machines, all on free play. The MGC also features the only known fully playable museum with an entire wing dedicated to having every console and personal computer from 1972 to present on display, including imports, all coordinated by Goldberg and *Die-Hard Gamer*'s J. D. Norman (diehardgamer.com).

As of 2020, the Midwest Gaming Classic continues to be held in the Milwaukee area.

Martin "Retro Rogue" Goldberg

Further Reading

Midwest Gaming Classic website. Accessed October 3, 2020. Available at http://www.midwestgamingclassic.com.

Military Use of Games

The military use of games includes simulations for training, propaganda, and recruitment as well as gamelike interfaces that correspond to actual events or material. They typically, although not always, feature first-person perspectives, realistic physics, tactical information (the user's position on a map), and, increasingly, photo-realistic graphics.

Militaries have primarily used games for training. This started with simple networked 3-D spaces, such as the U.S. Army's *Panzer* (1977); various simulators developed by Ralph Baer in the late 1970s; *Military Battlezone* (also known as the *Bradley Trainer*), which was commissioned in 1980 and developed from Atari's *Battlezone*; and SIMNET's *Close Combat Tactical Trainer* (1983–90) (Halter 2006). The 1990s saw the rise of aircraft, tank, infantry, and even maintenance simulators that were much more immersive. Training simulations are now widespread and can in some cases include wargames that take place in entirely virtual realms or that integrate virtual elements with physical elements such as vehicles, aircraft, hired actors, and special effects, such as injuries and pyrotechnics. Combat and surveillance operations have also been conducted through gamelike interfaces (light pens, joysticks, keyboards, televisual displays, etc.). Famous early examples are Project Whirlwind in 1953 (Redmond and Smith 2000) and Operation Igloo White in 1966 (Halter 2006). Current and upcoming uses of gamelike interfaces include systems for remote-controlled aircraft, submersibles, and robotic ground vehicles.

More recently, video games have been used for propaganda and recruitment purposes. The most notable example is the U.S. Army's *America's Army* series (2002, 2003, 2005, 2007, 2009), a free to download first-person shooting game, which is intended to promote the mission and values of the U.S. Army. A countervailing example is Hezbollah's *Special Force* series (2003 and 2007; see "Middle East"). There are also nonsanctioned consumer games that are criticized for promoting the mission or cultural cachet of militarism generally and often the U.S. military in particular (Nieborg 2006).

Although video games and military technologies have always been intertwined, this relationship has evolved in recent years to feature even more fully integrated goals, technologies, and personnel, such that it has warranted some analysts to refer to this relationship as the *military-entertainment complex*. Proponents argue that this nexus can reduce casualties and overall costs. Critics argue that simulations cannot effectively replicate combat, that there may be antidemocratic implications to media industries directly profiting from war, and that making war more virtual decontextualizes and inoculates against its destructive effects (Der Derian 2009; Stahl 2010).

Kyle Kontour

See also: *Battlezone*

Further Reading

Chaplin, H., and A. Ruby. *Smartbomb: The Quest for Art, Entertainment, and Big Bucks in the Videogame Revolution*. Chapel Hill, NC: Algonquin Books, 2005.

Der Derian, J. *Virtuous War: Mapping the Military-Industrial-Media-Entertainment Network*. 2nd ed. Boulder, CO: Westview Press, 2009.

Halter, E. *From Sun Tzu to Xbox: War and Video Games*. New York: Thunder's Mouth Press, 2006.

Nieborg, D. B. "Mods, Nay! Tournaments, Yay!—The Appropriation of Contemporary Game Culture by the U.S. Military." *Fibreculture Journal* 8 (2006). Available at http://journal.fibreculture.org/issue8/issue8_nieborg.html.

Redmond, K. C., and T. M. Smith. *From Whirlwind to MITRE: The R&D Story of the SAGE Air Defense Computer*. Cambridge, MA: MIT Press, 2000.

Stahl, R. *Militainment, Inc.: War, Media, and Popular Culture*. New York: Routledge, 2010.

Milton Bradley Vectrex. *See* GCE/Milton Bradley Vectrex

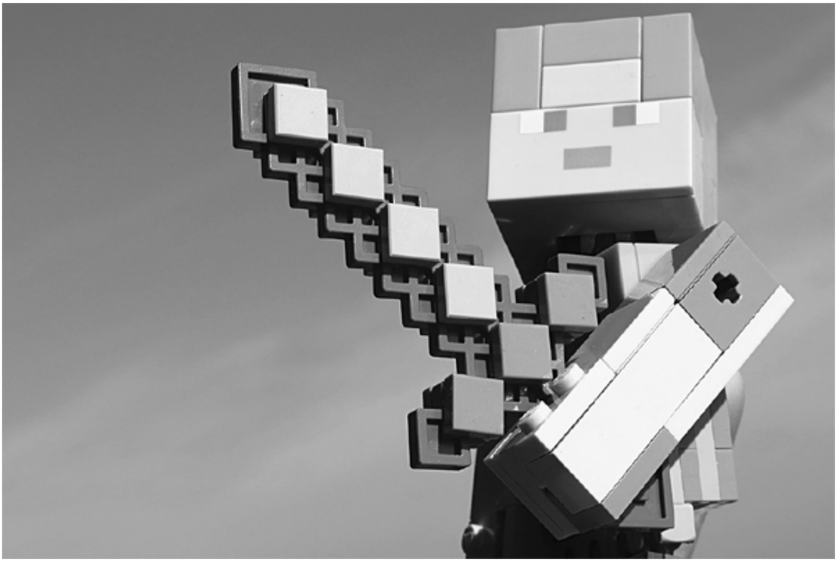
Minecraft

Minecraft is a sandbox game developed by the Swedish programmer Markus "Notch" Persson and later by the company he founded in 2010, Mojang. *Minecraft* was released to the public in an early test version in 2009, but the full version of the game was published on November 18, 2011. *Minecraft* is frequently ranked behind *Tetris* (1984) as the second highest-selling game title of all time, having sold 154 million copies as of January 2018. *Minecraft* has also had an immense cultural influence beyond the game itself, leading to merchandising, publishing, and many online channels and vlogs devoted to the game. Mojang and *Minecraft* were eventually sold to Microsoft in November 2014 for $2.5 billion.

Minecraft has its origins in the earlier *Infiniminer*, a game designed by the American video game programmer Zach Barth in 2009. A much earlier version of *Minecraft* can be seen in a YouTube video posted by Persson titled "Cave game tech test," which coincided with the leaking of the source code for *Infiniminer*.

Minecraft has been released on multiple platforms, including Microsoft Windows and macOS; the gaming consoles PlayStation 3, PlayStation 4, Xbox 360, and Xbox One; the handheld devices PlayStation Vita and Nintendo Switch; and mobile formats such as Android and iOS. *Minecraft* is under continual development, with additional content and refinements to gameplay and art elements supplied in the form of regular patches.

The sandbox world in *Minecraft* is depicted via procedurally generated three-dimensional blocks that can be collected by mining and digging, chopping trees, harvesting plants and animals, and so on. These blocks can be stored in a player inventory; combined to make items such as tools, weapons, and furnishings; and placed within the uniform three-dimensional grid that provides the world's structural scaffolding to build an unlimited range of items as diverse as simple homes, entire cities, working machines and computing devices, and pixel art.



A large LEGO statue of Alex, the first playable female character in *Minecraft,* holding a diamond sword. (Zayacskz/Dreamstime.com)

In addition to its players' avatars, the world of *Minecraft* is inhabited by a variety of different mobs, including hostile zombies, skeletons and creepers, farm and wild animals of various kinds, and villagers. The mobs have characteristic behaviors, spawn conditions, and drops, and utilizing these is key to accessing many of the key resources in the game. For example, upon its death, a village guardian called an Iron Golem drops a rose and several bars of iron. By constructing a complicated machine out of blocks, the player can "farm" the Iron Golem to produce a continual supply of iron.

The world is also arranged into various geographical *biomes* that have their own characteristic geology, plant life, mobs, and structures. Deserts contain sand and sandstone blocks, cactus, sticks, rabbits, desert monuments, and desert villages (inhabited by villagers). A deep ocean biome includes fish, seaweed, ocean monuments, and their guardians. Furthermore, the world also contains two other discrete areas with their own quite different characteristic features: the lava-filled Nether, accessible only by constructing a nether portal from obsidian blocks, and The End, comprising islands floating in a starless void.

Minecraft has several play modes that alter the difficulty of the game or focus the gameplay on either survival or free creative play. In survival mode, the game begins as the player spawns into a new world equipped only with a map. Typically, the player must gather resources to survive the first night, when the hostile mobs spawn. Survival mode has easy, normal, and hard settings; among the differences is that easy mode turns off the hostility of the mobs, and hard mode contains *permadeath*: if the character dies at any point during the game, the game world itself is lost. Creative mode frees the player from many of the restrictions of survival mode: blocks are instantly available, and the player can fly around the world.

The gaming objectives of *Minecraft* are largely undefined, and players may choose their own activities. However, several implicit goals can be discovered, and gameplay is often structured around completing the many subordinate goals necessary to achieving these. For example, defeating the endgame Ender Dragon requires travel to The End, which involves discovering the underground stronghold and opening an end portal that can be found there. Both discovering the stronghold and opening the portal require a supply of ender pearls, which must be collected from Endermen in combat (or via some harvesting technique). These further activities require the player to be equipped with weapons and armor, which requires the mining or harvesting of resources.

Individual worlds in *Minecraft* are spawned from numbered seeds, which means that copies of a single world can be generated by different players. Different world sizes are possible, but the PC version allows virtually infinite procedurally generated world sizes. To allow for the display of the expansive world, the world is sectioned into “chunks” that comprise sixteen-by-sixteen block sections of the world that are only generated when the player approaches them for the first time. Once they have been generated, chunks are saved by the program, but they are only loaded into random-access memory (RAM) when the player is nearby. The spawn chunk—the area where the player initially begins the game—is always loaded into memory.

Minecraft allows for multiplayer worlds, though it utilizes several different methods to do so, depending on platform and version. *Minecraft Realms* is a paid server hosting service that allows players to run multiplayer games. Console-based *Minecraft* usually necessitates that one player host a world that others may join. The console versions of the game also sometimes allow for split-screen gaming.

Several other versions or developments of *Minecraft* have followed from the release of the basic game. *Minecraft Story Mode* (2015) is a narrative-driven game that draws on the art style and thematic elements of *Minecraft*, and *Minecraft Education Edition* (2016) is a version that was developed for educational institutions.

Grant Tavinor

See also: World (of a Video Game)

Further Reading

Goldberg, Daniel, and Linus Larsson. *Minecraft: The Unlikely Tale of Markus ‘Notch’ Persson and the Game That Changed Everything*. 2nd ed. Translated by Jennifer Hawkins. New York: Seven Stories Press, 2015.

Minigames

A minigame typically refers to a game nested or situated within another game of comparatively larger scope. Given their small nature, a minigame will often privilege only one mechanic in the pursuit of having a player achieve a "parent" game's tertiary or voluntary goals. For example, *Spider-Man* (2018) features a series of "signal towers" that are strewn throughout the game's New York City environment. Upon player interaction, these towers produce an overlay that require a player to align two wavelengths by using the controller's analog sticks. Successful completion of this minigame across all of New York City's signal towers results in the full restoration of a network that unlocks a new map view for the player.

Minigames such as these are often contextually situated in their parent game and thus represent a larger action in-game (such as hacking, repairing, crafting, and travel) that may or may not be required for progression along the parent game's critical path.

A famous example of a noncritical minigame is the card game Pazaak in *Knights of the Old Republic* (2003). This card game can be played in nearly every major city in the game and allows the wagering of in-game credits on the outcome, but it has no effect on the endgame. Some games, such as *Rhythm Heaven* (2008) and the *WarioWare* games, use a collection of minigames as the basis of their overall gameplay.

Minigames sometimes also categorically encapsulate unlockable games that may be bonuses or Easter eggs achievable by a player, such as the "dream sequences" that can be unlocked in *Daxter* (2006) for the PlayStation Portable (PSP). Such sequences allow the player to playthrough a series of Daxter's dreams between main missions. These sequences tend to use simplified mechanics, most typically quick time events (matching on-screen button press patterns within a set time limit). Quick time events, made famous in games such as *Shenmue* (1999), are often considered to be reflex-based minigames in and of themselves.

Unlockable minigames may also be previous full versions of games that are smaller than the parent game. In *Ninja Gaiden* (2004) for the Microsoft Xbox, collecting enough scarabs and bringing them back to a store vender allows a player to play the original 8-bit version of *Ninja Gaiden* on an in-game arcade machine.

Finally, it is not uncommon to find "short" games that live outside of larger games that are also referred to as minigames. Such games usually only require a small investment of gameplay time to achieve the game's primary end state or complete a full game loop, lending themselves well to mobile titles, where players typically have shorter stints available for play. Minigames categorized under this rubric include match 3 variants such as *Threes* (2014) or *Two Dots* (2014), in which levels or rounds are incredibly short (just a few seconds) and a player can drop in or out without loss of progress.

Nis Bojin

See also: Easter Eggs; Unlockable Games

Further Reading

Francis, Bryant. "7 Great Minigames That Game Developers Should Study." Gamasutra, November 23, 2015. Available at https://www.gamasutra.com/view/

news/259435/7_great_minigames_that_game_developers_should_study.php.

Mixed Reality (MR)

Mixed reality (MR) games, also referred to as *holographic gaming*, combine virtual objects with the real world by anchoring digital environments in the player's physical setting. As the most recent innovation in reality technologies, MR remediates elements of its older predecessors, virtual reality (VR) and augmented reality (AR), combining the interactivity of the former with the pairing of real and digital objects of the latter. Although some debate the difference between AR and MR, and the two terms are often used synonymously, MR is generally distinguished by its focus on interaction between (and not just the copresence of) physical and computer-generated objects. MR games can be divided into two types: as with *HoloTour* (2017), one starts with the real world and overlays virtual elements on it; others, such as *RoboRaid* (2016) and *Fragments* (2017), start with a virtual environment that is shaped by the player's physical surroundings. The former lies further on the spectrum toward AR, while the latter exhibits characteristics of VR, with the key exception that digital objects are superimposed on real ones. Compared to console and PC gaming, MR gameplay shares VR's more intuitive interaction with the game environment through natural interfaces, such as voice commands and head and hand movements. Unlike VR head-mounted displays (HMDs), such as Oculus Rift, MR headsets also scan the user's environment to overlay virtual elements onto the field of vision.

Whereas VR shuts out the real world, MR gameplay takes place in a digitally augmented version of it. *Pokémon GO* (2016) utilizes AR technologies that originated with photo tagging on Facebook and face filters on Snapchat. Like AR, MR projects holographic mise-en-scène and characters onto the player's actual setting. Apple's *ARkit* (2016) marked a milestone in AR mobile device gaming through its highly interactive holographs. *ARkit 2* (2018) then introduced a multiplayer component, allowing competitors to interact with the same object from their own unique perspectives.

Since the introduction of Microsoft HoloLens through the game *Project X-Ray* (2015), HoloLens has emerged as the leader in MR gaming. Its major achievements include *RoboRaid* (2016), where one's walls are penetrated by invading enemy robots, and *Fragments* (2017), which turns the player's home into a crime scene. In *Zarzl* (2017), players explore a maze in an open space during an alien invasion. While the first two titles can be played at home, *Zarzl* requires a larger open space, such as a parking lot. Recently, public gaming spaces have begun to emerge in converted laser tag arenas that feature MR play in multiplayer games that range from puzzle and exploration-style play to zombie shooters.

As MR is a new format driven by emerging technology, its primary uses and cultural definitions are still very much in flux. In addition to the games previously mentioned, there exists a range of other innovative uses. *HoloTour* (2017), also by HoloLens, enables tourists to view the monuments and ruins they visit through HMDs that provide explanatory digital information. Real footage of the Forum in Rome, for example, is animated with interactive virtual data detailing its multiple archeological dimensions. This delivery of nonfictional data through highly engaging MR suggests the medium's potential for newsgames. Uses of the technology also include educational, business, medical, and military applications. *HoloSurg* (2017), for example, has been used by surgeons to overlay previously captured MRI and radiographic information onto a patient's body during surgery to render visible the obscure bodily interior in the environs of tumors. In addition to developing software for NASA, allowing for collaborative space exploration, Microsoft has also recently won a $480 million U.S. military contract to develop training simulation software with HoloLens. At this early stage, the MR gaming industry's few startups include *Magic Leap* (2018), which pioneered headsets featuring the first eye-tracking technology to render near objects in sharper definition and set far elements at a greater distance away.

With respect to hardware, PC-connected HMDs provide the most immersive MR experience. Due to the high cost of PlayStation VR, Oculus Rift, and HTC Vive, more affordable stand-alone HMDs have become popular. These products, which include Samsung Gear VR, Google Daydream, and Google Cardboard (the lowest-priced headset on the market) operate with a smartphone inserted in the viewer. HP and Acer developed MR headsets equipped with tracking devices for Windows HoloLens, a milestone innovation leveraging AR's camera/projector function with VR's intuitive interactivity and signature immersive experience.

David O. Dowling and Christopher Goetz

See also: Augmented Reality; Virtual Reality

Further Reading

Bailenson, Jeremy. *Experience on Demand: What Virtual Reality Is, How It Works, and What It Can Do*. New York: W. W. Norton and Company, 2018.

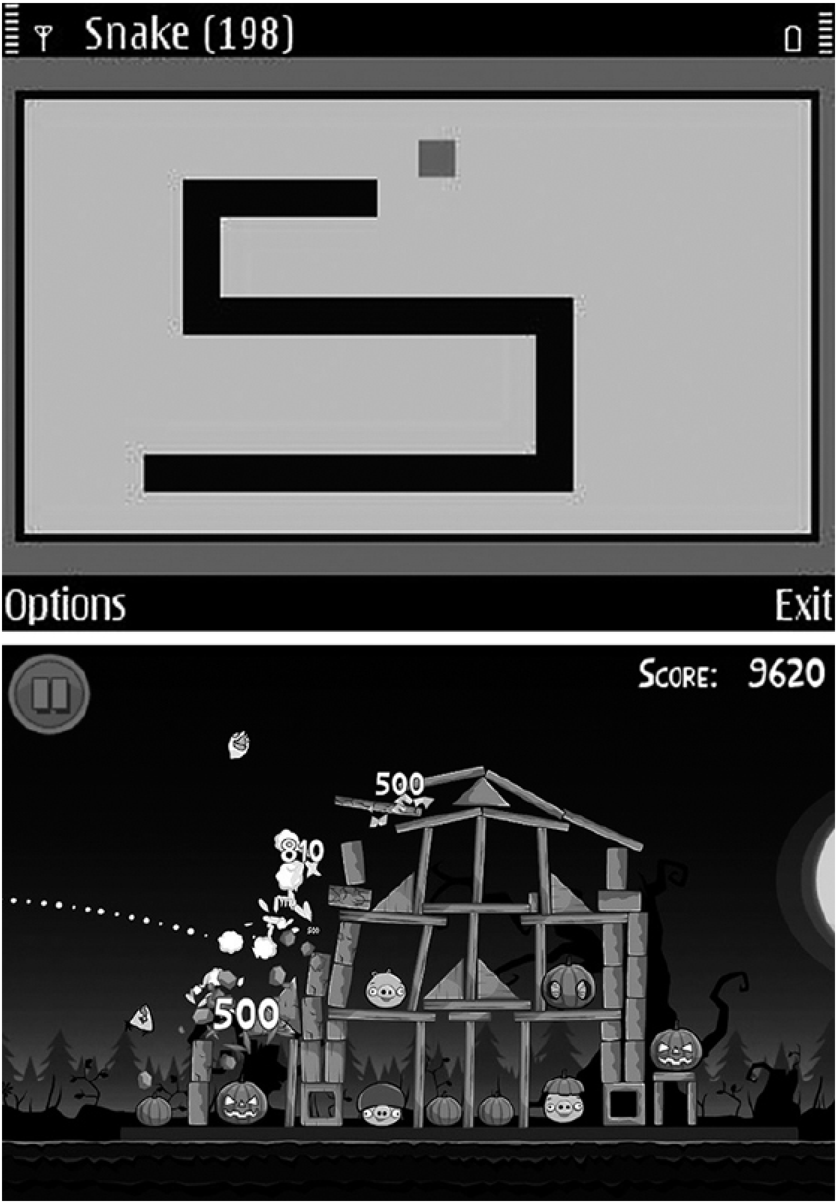
Evans, Leighton. *The Re-Emergence of Virtual Reality*. New York: Routledge, 2019.

MMORPGs. *See* Massively Multiplayer Online Role-Playing Games

Mobile Games

Mobile games are games designed to be played on mobile phones or similar portable digital devices. Games designed for handheld game consoles are, however, generally not considered to be mobile games in this sense of the term. As the implementation of games as services and the spread of high-speed networks continues, the *same game* can now be accessible on multiple devices, as the player moves from one screen to another; consequently, the term *mobile games* will grow even fuzzier in the future.

A modern smartphone is effectively a small, network-enabled computer that users trust and carry around with them. Thus, the potential for original, online, and context-aware games implemented for mobile phones appears great, particularly considering that active mobile broadband subscriptions reached 5.3 billion in 2018, and mobile devices had become the most popular gaming platform, passing both personal computers and dedicated video game consoles. Mobile games took a while to reach that potential, however, and the most popular mobile game for over a decade was *Snake*, a simple arcade-style action-puzzle game, which had been included with popular Nokia handsets since 1997. However, since the 2007 introduction of Apple’s iPhone, mobile games designed for the touchscreen quickly became the norm, including such popular games as *Angry Birds* (2009), *Clash of Clans* (2012), and the location-based mobile game *Pokémon GO* (2016).


Snake (198)
Options
Exit
Score: 9620
500
810
500

Snake **(Nokia, 1997) [top] and** ***Angry Birds Halloween*** **(Rovio, 2010) [bottom]. (Courtesy of Mark J. P. Wolf)**

Nevertheless, for a long time, various technological restrictions, such as small screens and cramped keyboards, kept mobile game design from reaching full maturity. Other challenges included the technological fragmentation of the marketplace, which limited business opportunities and the possibility of original or independent mobile games. With the introduction of user-friendly interfaces and online market places (e.g., Apple's App Store and Google's Play Store), with their integrated micropayment and digital distribution systems, these barriers have largely been removed. With enhanced technologies and new audiences, the mobile game design space has greatly expanded during the last decade.

Platform fragmentation was another issue that slowed the evolution of mobile games: differences in software and hardware can require game developers to implement hundreds of release versions of a game to reach a critical mass of customers. The mobile operator's role as gatekeeper was another source of fragmentation: in the late 1990s and early 2000s, customers usually received new games through their operator's portal (the "carrier's deck"), and, consequently, individual arrangements with numerous operators needed to be made to have a wide distribution for a mobile game.

Historically, several distinct mobile game ecosystems evolved, each grown on top of a certain technology platform. The most popular systems included Java ME, Qualcomm's BREW, and dedicated smartphone operating systems, such as Palm OS, Symbian OS, and Windows Mobile. In early phases, Java emerged as the most open environment for mobile game developers, whereas developing a native Symbian, iPhone, or BREW application involved going through a stricter screening and licensing procedure with the handset manufacturer, distributor, or operator. It was with the introduction of the iPhone with its iOS and App Store (2008) that online digital distribution finally started to open up. In 2017 alone, Apple's App Store and Google's Play Store reported over 175 billion app downloads.

Many mobile games still look like scaled-down versions of established video games and game genres. Mobile casual games are a natural option for developers implementing gaming entertainment that is consumed in short breaks while commuting or otherwise filling in time. Many successful games are specifically designed to make best use of the mobile phone interface, including using a simplified control scheme, and enjoyable and varied gameplay is possible using only one push button (Green 2005). However, research and development for mobile games have gone beyond earlier video games formulas and have aimed at exploiting the unique opportunities provided by mobile devices. Such "truly mobile games" include location-based games or games that otherwise exploit context awareness and thus can be equally termed as mixed reality (MR), hybrid, or pervasive games.

Games created for smartphones have also made innovative use of their integrated cameras, Bluetooth capabilities, and built-in sensors, such as gyroscopes, to facilitate augmented reality (AR) gaming. Always-on mobile data connections in contemporary mobile phones allow interesting multiplayer interactions while roaming city streets. *BotFighters* (2000), by the Swedish company It's Alive!, was one of the earliest commercial location-based multiplayer games, relying on GSM cell locations and SMS messaging. The potentials of GPS tracking were also exploited early by experimental MR games such as Blast Theory's *Can You See Me Now?* series (2001–4) and Newtgames' *MogiMogi* (2004) in Japan. The treasure hunting practice of *geocaching* has also become established as a truly mobile style of play.

The phenomenal success of *Pokémon GO*, published by Niantic in 2016, has transformed the landscape of location-based mobile games, with more AR and MR games to follow in the future.

Frans Mäyrä

See also: Augmented Reality; Mixed Reality; *Pokémon GO*

Further Reading

Green, B. "One Button Games." Gamasutra, June 2, 2005. Available at http://www.gamasutra.com/view/feature/130728/one_button_games.php.

International Telecommunication Union ITU. "New ITU Statistics Show More the Half the World Is Now Using the Internet." ITU News, December 6, 2018. Available at https://news.itu.int/itu-statistics-leaving-no-one-offline/.

Sydow, Lexi, and Sam Cheney. "2017 Retrospective: A Monumental Year for the App Economy." App Annie, January 17, 2018. Available at https://www.appannie.com/en/insights/market-data/app-annie-2017-retrospective/.

Tammenkoski, M. "Dealing with a Fragmented Java Landscape for Mobile Game Development." Gamasutra, December 17, 2003. Available at http://www.gamasutra.com/view/feature/131179/dealing_with_a_fragmented_java_.php.

Modifications. *See* Game Modifications

Molyneux, Peter (1959–)

Peter Douglas Molyneux is an English game designer and computer programmer. Molyneux holds the rank of Officer of the Order of the British Empire (OBE) and is an Academy of Interactive Arts & Sciences (AIAS) Hall of Fame inductee. He was awarded the title of Chevalier de l'Orde des Arts et des Lettres in 2007 and received an honorary doctor of science from the University of Southampton in the same year. He is the founder of Bullfrog Productions and Lionhead Studios and is currently the creative director of Microsoft Game Studios.

Peter Molyneux's career began when he ran a business that sold and distributed floppy disks in 1982. Later, in an effort to increase sales, he included software on the disks, composed primarily of video games for the Atari 8-bit family series of home computers and the Commodore 64. The positive response garnered from the included games piqued Molyneux's interest in the gaming industry and prompted him to try his own hand at game design.

His first effort, a business simulation game called *The Entrepreneur* (1984), failed to find an audience and sold only two copies. Confronted with this setback, Molyneux temporarily shied away from game design. He founded a new company called Taurus Impact Systems with his business partner Les Edgar. Taurus was set up to design office database systems. Due to a syntax error, Commodore International mistook Taurus Impact Systems for a more established company called TORUS. From this oversight, Molyneux's company obtained a contract with Commodore to redesign a database system for the Amiga computer. Commodore supplied Molyneux with eight Amiga systems to facilitate the redesign. The database program went on to become a financial success and provided Molyneux and Edgar with the capital they needed to found their own gaming company, Bullfrog Productions.

Under the management of Molyneux, Bullfrog Productions produced ten games over the course of as many years (1987–97). Molyneux's software credits at Bullfrog include *Fusion* (1987), *Populous* (1989), *Powermonger* (1990), *Populous II: Trials of the Olympian Gods* (1991), *Syndicate* (1993), *Theme Park* (1994), *Magic Carpet* (1994), *High-Octane* (1995), *Genewars* (1996), and *Dungeon Keeper* (1997). *Populous* stands as Bullfrog's most successful title and is regarded as the first computer "god game." In 1994, Molyneux became vice president of Bullfrog's publisher, Electronic Arts (EA), which acquired the studio and a significant share of the company in 1995. Molyneux left Bullfrog Productions in August 1997 to start Lionhead Studios.

Molyneux spent three years and $6 million dollars of his own money developing Lionhead's first title, *Black & White* (2001), a god game that combined elements of action, strategy, and artificial life. The title received critical praise for its programming ingenuity and game mechanics. Additional titles Molyneux designed at Lionhead Studios include *Fable* (2004), *Fable: The Lost Chapters* (2005), *The Movies* (2005), *Black & White 2* (2005), *The Movies: Stunts & Effects* (2006), *Black & White 2: Battle of the Gods* (2006), *and Fable II* (2008). *Fable* was the first game developed by Big Blue Box, a satellite studio of Lionhead Productions. The game was published by Microsoft and available for the IBM PC, Mac OS X, and the Microsoft Xbox. *Fable*'s sequel, *Fable II*, was released exclusively for the Microsoft Xbox 360. Microsoft Game Studios acquired Lionhead Studios in April 2006. In June 2009, Molyneux was promoted to creative director of Microsoft Game Studios.

In March 2012, Molyneux announced plans to step down from Lionhead and Microsoft to work at 22 Cans, a company started by former Lionhead CTO, Tim Rance. The first title for 22 Can, *Curiosity: What's inside the Cube?*, was released on November 6, 2012. The game was a multiplayer social experiment title created for iOS and Android. Over three million users broke through approximately twenty-seven billion "cubelets" to complete the game. On May 26, 2013, Bryan Henderson removed the final piece of the cube to become the game's prize recipient.

The titles that followed from 22 Cans faced development problems, with *Godus* (2014) and *Godus Wars* (2016) failing to progress past early access on various platforms. In collaboration with publisher Kongregate, the company developed and released *The Trail* (2017) for iOS and Google Play. In April 2017, Molyneux announced development on a new title, *The Legacy*. As of 2019, it remains in preproduction.

Aaron D. Boothroyd

See also: God Games

Further Reading

Dale, Laura Kate. "Peter Molyneux Interview: 'It's Over, I Will Not Speak to the Press Again.'" *The Guardian,* February 13, 2015. Available at https://www.theguardian.com/technology/2015/feb/13/peter-molyneux-game-designer-interview-godus.

22 Cans website. Accessed October 3, 2020. Available at http://www.22cans.com.

Morality and Ethics

Morality and ethics are closely related and overlapping concepts; the terms are often used interchangeably. However, morality tends to concern itself with standards and conduct, whereas ethics focuses more on systems and processes. Put simply, morality addresses the *content* of right and wrong, whereas ethics addresses the *way* of determining right and wrong. For decades, many theorists and researchers have debated the meaning of morality and ethics in video games. Some argue that video game play is of little moral consequence or influence in the nongaming lives of those who play them, but others contend that video games can and do affect the moral development of players.

Matt McCormick (2002) and Ren Reynolds (2002) suggest that the ethical assessment of video games should stem from the historic questions of moral philosophers:

Aristotle (virtue ethics): What produces virtuous character? Can video games produce virtuous character? Does participation in simulated violence erode players' moral character or hinder players' flourishing and fulfillment?

John Stewart Mill (utilitarianism): What causes the most harm or the most good? Do the consequences of video game play produce more harm or more good?

Immanuel Kant (deontology): What is one's highest duty or moral obligation? Does video game play hinder players from performing those duties and obligations? Can video game play assist players to perform those duties and obligations in some way?

Many educators and psychologists argue that video games too often hinder the moral development and behavior of those who play them. Eugene Provenzo's *Video Kids: Making Sense of Nintendo* (1991) offers the first formal assessment of morality and ethics within video games, specifically Nintendo Entertainment System (NES) video games. Provenzo argues against the alleged neutrality of video game media. He contends that an alarming number of video games sponsor a curriculum of violence and sexism. Provenzo also expresses particular concern about the deterministic influence that video games can have on children. Later, the American Psychological Association (APA) passed a "Resolution on Violence in Video Games and Interactive Media" (2005) condemning the violent, racist, and sexist influence of video games. The APA recommends a strategy of media literacy education, industry self-regulation, and the development of a more accurate content-based rating system.

In particular, the social science research of Craig A. Anderson, Douglas A. Gentile, and Katherine E. Buckley (2007) supports the APA's resolution. Their work links violent video game play with verbal and physical aggression, both in the short and long term. Anderson and his colleagues aspire to limit negative media effects on those who play video games. Later meta-analyses support the conclusion that violent video game play among children and adolescents is positively associated with various forms of aggression (Calvert et al. 2017; Prescott, Sargent, and Hull 2018). However, a more recent long-term study of adult *Grand Theft Auto V* (2013) players indicates an absence of negative effects at the conclusion of two months of gameplay and again two months after gameplay had ended (Kühn et al. 2019). In summary, Provenzo, Anderson, the APA, and others argue that many video games exert an *immoral* influence on players—particularly children who play video games.

In contrast, other researchers argue that video games can exert a *moral* influence on players. For example, Henry Jenkins proposes that critics take a more moderate view of media effects and the moral influence of video games. He discounts the deterministic perspective that violent video games must exert a negative influence on seemingly passive video game players. Instead, he maintains that violent video games constructively offer adolescents "a fantasy of empowerment" and "a fantasy of transgression, a chance to test the limits of their parent's culture" (Jenkins 2000). In other words, video games provide players with a platform for expressing their feelings and working through their life concerns. Jenkins builds his argument on a humanistic perspective that video game players are free to engage in ethical reflection on the games that they play. He suggests that video game play is an active process in which video game players construct their own meanings.

Similarly, Miguel Sicart (2009) argues that video games contain embedded values with which players may freely interact. To Sicart, video game players are moral beings who bring their own perspectives to bear on gameplay. Thus, he maintains that video games can empower players to develop a deeper capacity for ethical reasoning and reflection skills. Sicart suggests, however, that when video games measure and evaluate the players' ethical choices, the games tend to limit the moral development of those who play them. He argues that when video games explicitly reward in-game moral behavior, that behavior becomes a strategy to win instead of an expression of ethical reflection. In this light, Sicart defines "ethical gameplay" as "the ludic experience in which regulation, mediation, or goals require from the player moral reflection beyond the calculation of statistics and possibilities" (2013, 24). He is a proponent for the kind of video game design that allows players the freedom to express their own values with authenticity and to shape virtual worlds in that light. In summary, Jenkins and Sicart argue that video games present players with a playful opportunity for ethical reflection and moral expression.

Many theorists and practitioners argue that through careful game design, video games can and do sponsor occasions for ethical reflection and moral thought. For example, Ian Bogost (2007) suggests that video game procedures and rhetoric must present players with moral ambiguities that can elicit ethical reflection. However, Harry J. Brown (2008) contends that most video games inevitably shield their players from difficult ethical dilemmas by situating moral decisions within simplistic categories of good and evil. Mark J. P. Wolf (2003) also suggests that video games will remain unable to achieve ethical and moral depth until they elicit deep emotions and feelings from players. Lars Konzack (2008) calls for open-ended video games within which players can experiment with and explore a variety of ethical processes and moral values. The Values at Play project (Flanagan and Nissenbaum 2014) recommends an intertwined triad of game design components to conscientiously embed social values into video games: discovery (identification of values), implementation (translation of values into game operations), and verification (assessment of gameplay outcomes).

In 1976, Exidy's arcade game *Death Race* gave players ninety-nine seconds to run over elusive pedestrians in the style of a demolition derby. Dead pedestrians screamed as they were replaced by tombstones. The monochrome graphics were relatively simple. The game described the pedestrians as "gremlins." Nevertheless, *Death Race* is remembered as the first video game to arouse public moral outrage.

In the 1980s, video games saw innovations on both ends of the moral spectrum. In 1982 and 1983, Mystique published a trio of self-described "adult video game cartridges" for the Atari VCS 2600. The most notorious of the three is the simplistic *Custer's Revenge* (1982), in which the player character dodged a hail of battlefield arrows before raping a bound female Native American. In contrast, Origin Systems published the innovative computer role-playing game (RPG) *Ultima IV: Quest of the Avatar* (1985), in which players assumed the role of a hero in search of moral perfection. Along the way, the computer kept track of players' progress in each of eight virtues. Hayse (2009) argues that the morality system of *Ultima IV* effectively enabled ethical reflection from the player largely due to twin factors: the concealment and opacity of its "moral economy" and its reliance on qualitative player feedback rather than quantitative feedback. Combined, both factors contributed to the construction of a "possibility space" (Bogost 2007) for exploring ethical values.

The 1990s stand out as a decade in which graphic violence in video games led to industry regulation. For example, Id Software popularized the first-person shooter (FPS) with its *Wolfenstein 3D* (1992), *Doom* (1993), and *Quake* (1996) franchises. In 1992, Midway Games launched its *Mortal Kombat* franchise. The year 1994 heralded the establishment of the Entertainment Software Rating Board (ESRB), a self-regulatory body that establishes general guidelines for labeling video games in terms of violence, profanity, and sexual content. As public concern about video games reached acute levels, the 1990s ended with the Columbine High School shootings in April 1999, which were blamed in part on the violent gameplay of *DOOM*. Some critics contested this link (Jenkins 2000).

More recently, moral ideas and ethical processes have moved closer to the forefront of video game design. The RPG *Deus Ex* (2000) engages players in critical ethical reflection on the moral implications of terrorism. Peter Molyneux's real-time strategy (RTS) game *Black & White* (2001) casts players in the roles of fledgling deities who shape the moral development of worshipful tribes through acts of divine benevolence and tyranny. The year 2001 also saw the release of the third game in the *Grand Theft Auto* series, an RPG in which players explore the relative degrees of morality within urban gang life. In 2002, the Serious Games Initiative began to issue proposals for video games that addressed global, social, and ethical issues. The year 2002 also introduced the FPS *America's Army:*

Operations—a strict military simulation that replicates the moral practices and ethical processes of serving in the U.S. Army. The RPG *Star Wars: Knights of the Old Republic* (2003) incorporates the moral contrast between the light side and dark side of the Force throughout gameplay. *BioShock* (2007), another RPG, confronts players with a narrative series of ethical dilemmas and moral choices that reflect the philosophical framework of Ayn Rand. Other video game series, such as *Assassin's Creed* (2007), *Mass Effect* (2007), *The Witcher* (2007), *Dragon Age* (2009), *Red Dead Redemption* (2010), and *The Walking Dead* (2012), also deploy ethical dilemmas and moral choices in gameplay.

Mark Hayse

See also: Censorship; Education (Religious); Entertainment Software Rating Board; God Games; Spirituality

Further Reading

American Psychological Association. "Resolution on Violence in Video Games and Interactive Media." 2005. Available at https://www.apa.org/about/policy/interactive-media.pdf.

Anderson, Craig A., D. A. Gentile, and K. E. Buckley. *Violent Video Game Effects on Children and Adolescents*. Oxford, UK: Oxford University Press, 2007.

Bogost, Ian. *Persuasive Games: The Expressive Power of Videogames*. Cambridge, MA: MIT Press, 2007.

Brown, Harry J. *Videogames and Education*. New York: M. E. Sharpe, 2008.

Calvert, Sandra L., Mark Appelbaum, Kenneth A. Dodge, Sandra Graham, Gordon C. Nagayama Hall, Sherry Hamby, Lauren G. Fasig-Caldwell, Martyna Citkowicz, Daniel P. Galloway, and Larry V. Hedges. "The American Psychological Association Task Force Assessment of Violent Video Games: Science in the Service of Public Interest." *American Psychologist* 72, no. 2 (2017): 126–143.

Cogburn, Jon, and Mark Silcox. *Philosophy through Video Games*. New York: Routledge, 2008.

Flanagan, Mary, and Helen Nissenbaum. *Values at Play in Digital Games*. Cambridge, MA: MIT Press, 2014.

Hayse, Mark. *Religious Architecture in Videogames: Perspectives from Curriculum Theory and Religious Education*. Trinity Evangelical Divinity School, PhD diss., 2009.

Jenkins, Henry. "Lessons from Littleton: What Congress Doesn't Want to Hear about Youth and Media." National Association of Independent Schools, 2000. Available at https://postarchive.files.wordpress.com/2015/03/what-congress-doesnt-want-to-hear-about-youth-and-media.pdf.

Konzack, Lars. "Philosophical Game Design." In *The Video Game Theory Reader 2*, edited by Mark J. P. Wolf and Bernard Perron, 33–44. New York: Routledge, 2008.

Kühn, Simone, Dimitrij Tycho Kugler, Katharina Schmalen, Markus Weichenberger, Charlotte Witt, and Jürgen Gallinat. "Does Playing Violent

Video Games Cause Aggression? A Longitudinal Intervention Study." *Molecular Psychiatry* 24 (2019): 1220–1234. Available at https://www.nature.com/articles/s41380-018-0031-7.

McCormick, Matt. "Is It Wrong to Play Violent Video Games?" *Ethics and Information Technology* 3, no. 4 (2002): 277–287.

Prescott, Anna T., James D. Sargent, and Jay G. Hull. "Metaanalysis of the Relationship between Violent Video Game Play and Physical Aggression over Time." *Proceedings of the National Academy of Sciences of the United States of America* 115, no. 40 (2018): 9882–9888. Available at https://www.pnas.org/content/115/40/9882.

Provenzo, Eugene. *Video Kids: Making Sense of Nintendo*. Cambridge, MA: Harvard University Press, 1991.

Reynolds, Ren. "Playing a 'Good' Game: A Philosophical Approach to Understanding the Morality of Games." 2002. Available at https://inst.eecs.berkeley.edu/~cs10/fa09/dis/02/extra/reynolds_ethics.pdf.

Sicart, Miguel. *The Design of Ethical Gameplay*. Cambridge, MA: MIT Press, 2013.

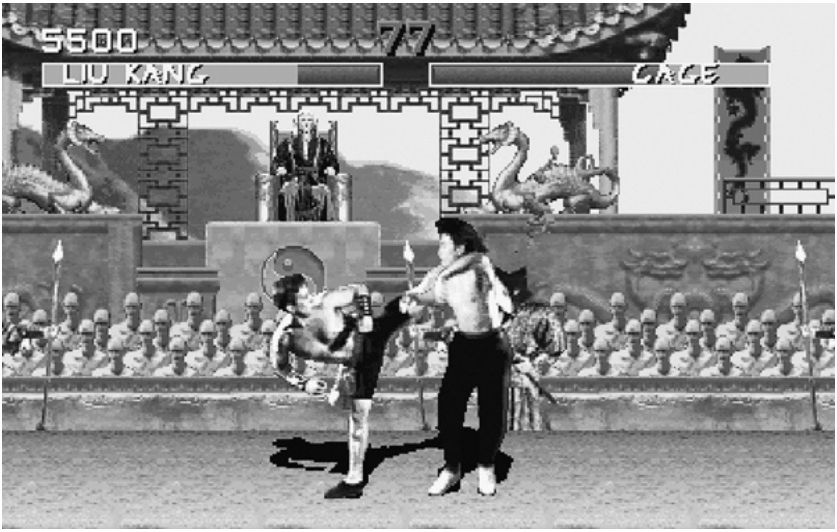
Sicart, Miguel. *The Ethics of Computer Game Design*. Cambridge, MA: MIT Press, 2009.

Wolf, Mark J. P. "From Simulation to Emulation: Ethics, Worldviews, and Video Games." In *Virtual Morality: Morals, Ethics, and New Media*, edited by Mark J. P. Wolf, 63–77. New York: Peter Lang Publishing, 2003.

Wolf, Mark J. P. "Chapter 40: Morals, Ethics, and Video Games." In *The Video Game Explosion: A History from PONG to PlayStation and Beyond*, 283–291. Westport, CT: Greenwood Press, 2007.

Mortal Kombat

Mortal Kombat is a fighting game developed by Midway Manufacturing. Designed by Ed Boon and John Tobias, it was released in arcades in 1992. *Mortal Kombat* was developed as Midway's response to Capcom's highly successful *Street Fighter II* (1991). Although it brought some changes to the established fighting game mechanics—such as a dedicated "block" button or the ability to "juggle" the helpless opponent in the air with well-timed successive hits—it primarily became famous for its gratuitous, over-the-top violence. Not only would well-placed blows send geysers of blood across the screen, but the game also introduced the concept of "fatalities"—spectacularly gruesome finishing moves. At the conclusion of the fight, while the weakened opponent swayed in stunned stupor, a special combination of joystick moves and button presses would unleash a character-specific deadly attack. These included the ability to decapitate, incinerate, or electrocute the rival. In addition, *Mortal Kombat* used digitized graphics, which at the time appeared highly realistic, especially compared with the cartoonish style of other contemporary fighting games.



A screenshot of the original *Mortal Kombat*. (Courtesy of Mark J. P. Wolf)

Following the game's success in the arcades, *Mortal Kombat* was ported by Acclaim Entertainment for home consoles, handhelds, and home computers. The home console versions were released on September 13, 1993 ("Mortal Monday"), to the accompaniment of a $10 million advertising campaign—at the time, the most expensive promotional effort by an independent publisher. Flung into the public eye, the game instantaneously sparked great controversy. Even as some stores refused to carry the title, sales boomed, and *Mortal Kombat* went on to become the best-selling game of the year.

Different ports of the game replicated the arcade original with varying degrees of faithfulness. Notably, the SEGA versions retained all the violence and gore, although the Genesis and Game Gear editions required the player to enter a cheat code to unlock those features. Nintendo, however, in keeping with its family-friendly policy, refused to allow the game on its systems unless a number of changes were made. Thus, the Super Nintendo Entertainment System (SNES) port replaced blood with gray "sweat" and removed or considerably toned down the fatalities (renamed "finishing moves"). As a result, the game became a significant factor in the battle for market dominance between Nintendo and SEGA, with the uncensored Genesis version massively outselling the SNES version.

The SEGA CD edition also played a major role in the 1993–94 U.S. Senate hearings on video game violence that led to the formation of the Entertainment Software Rating Board (ESRB) and the creation of the video game rating system. Ironically, the hearings, during which *Mortal Kombat* was held up as one of the prime examples of the game industry marketing mature content to minors, generated much additional publicity for the game, accelerating the already strong sales. As a sardonic commentary on the controversy, *Mortal Kombat II* (1993) supplemented the fatalities with "babalities" (turning the defeated fighter into an infant) and "friendships" (offering the opponent a token of friendship).

Interestingly, the SNES version of *Mortal Kombat II* reproduced all the gore present in the arcade original.

The game spawned a number of sequels across all major gaming platforms as well as three action-adventure spin-offs. It was adapted into two feature films, *Mortal Kombat* (Paul W. S. Anderson, 1995) and *Mortal Kombat: Annihilation* (John R. Leonetti, 1997). It also inspired the live-action series *Mortal Kombat: Conquest* (1998–99) and the animated series *Mortal Kombat: Defenders of the Realm* (1996) as well as a novel, several comic books, and a trading card game.

P. Konrad Budziszewski

See also: Midway Games

Further Reading

Fahs, Travis. "The History of *Mortal Kombat.*" IGN. Available at https://www.ign.com/articles/2011/05/05/the-history-of-mortal-kombat.

Jones, Darran. "Blood Simple: The History of *Mortal Kombat.*" *Retro Gamer* 40 (2007): 26–33.

Kent, Steven L. "*Moral Kombat.*" In *The Ultimate History of Video Games: From Pong to Pokémon and Beyond: The Story behind the Craze That Touched Our Lives and Changed the World*, 461–480. New York: Three Rivers Press, 2001.

Mortal Kombat Wiki. Accessed October 3, 2020. Available at http://mortalkombat.wikia.com.

Motion Capture and Motion Control

Also designated as *motion tracking* or, commonly, *mocap*, *motion capture* is the process of capturing and recording movements from a real actor or element and then using the translated data to control a digital model. The movements are recorded or restituted in real time through other digital systems as three-dimensional data. This technique helps give an illusion of life to three-dimensional models or avatars by reproducing natural movement, complete with secondary motions that would be difficult to animate realistically by hand. Motion tracking technology was initially developed in the medical world and by the military in the 1970s. During the 1980s, the field began to be combined with that of computer imagery as the technology's potential was explored, and in the 1990s, mocap technology was progressively applied in film production.

Since the 2000s, motion capture applications have been used in video games in which three-dimensional graphics are involved, in television shows in which virtual settings include digital characters animated by real actors, in professional sports for performance analysis, and in the art domain for works that range from experimental dance and theater to digital puppetry. As current video game consoles offer significant processing power, players have come to expect believable character models that accurately reflect their human movements and behaviors. Because of the need to record human movement, actors, stuntmen, and martial artists from the film industry have taken on roles in video games, and when motion capture includes one's face and fingers and records a subject's subtle expressions, it is sometimes referred to as *performance capture*.

Two main categories of mocap systems are used in the entertainment industry: optical or nonoptical, which can either be magnetic, electromechanical, or inertial systems. Optical systems were primarily designed for medical applications (e.g., orthopedics, rehabilitation, traumatology, and, mostly typically, biomechanics) and usually involve four to thirty-two cameras controlled by a computer. Capture subjects wear markers that can either be reflexive (passive) or light emitting (active). Passive markers are usually spherical or circular and are attached to the subject's skin or to a full-body mocap suit made from elastic materials. Cameras in a passive marker system are equipped with light-emitting diodes (LEDs), and the passive markers reflect their light. On the other hand, active markers are themselves LEDs. Some active systems illuminate markers one at a time to avoid any identification problem, whereas others activate markers all at once, modulating the amplitude or frequency to identify markers. Optical mocap systems have accurate data and a high capture rate and allow a large number of markers on different subjects. Their postprocessing, however, is extensive, as markers can be occluded (resulting in loss of data), and lighting must be carefully controlled during capture sessions.

Electromagnetic motion capture systems are sometimes called *magnetic trackers*. They descend from the sensors placed on a military aircraft pilot's helmet to track the pilot's head position. Magnetic systems are usually smaller than optical mocap systems and are less expensive. Position and orientation are available without postprocessing, and they also have the advantage of allowing feedback through real-time applications. Tracking sensors are prone to interference, however, and their wiring and batteries also limit the subject's movements.

Electromechanical mocap systems, such as exoskeletons and data gloves, are articulated devices that directly measure joint angles on capture subjects. They work in real time and are relatively inexpensive, free of occlusions and electromagnetic interferences, and highly portable. The disadvantages of electromechanical mocap systems are that they restrict capture movements, have fixed sensors or configurations, are breakable, and offer low sampling rates.

When motion tracking is integrated into a cybernetic system that manifests change through feedback and adaptation, some control over that system becomes possible. The capture of finger and hand movement enables computer use, as in the case of the keyboard and mouse. From classic joysticks and control pads to more sophisticated game controller devices, the video game industry has integrated a wide variety of motion control devices into its systems.

In November 2006, Nintendo released the Wii Remote (also known as the Wiimote), a control pad coupled with two built-in infrared detectors and miniature accelerometers. The Wii Remote is a low-cost inertial motion capture solution, considering that this technology usually combines a gyroscope, magnetometer, and accelerometer to measure precise rotational rates. The Wii bundle retail package also included the Nunchuk, which features an accelerometer, a traditional analog stick, and two trigger buttons. The Wii MotionPlus expansion device of June 2009 granted a more accurate capture of complex motion and brought motion rendering closer to real time. These devices, compatible with the Nintendo Wii U, allowed position detection in three-dimensional space when directed at the Sensor Bar, which is, in fact, not a sensor but an infrared LED inductor that allows the controllers to be triangulated. The eighth-generation Nintendo Switch console also uses the Wii Remote and Nunchuk.

Four years after Nintendo's Wii Remote, Sony's PlayStation Move appeared in 2010 and included its own duo of main motion controller and subcontroller. The device offered a set of small buttons similar to the ones found on the PlayStation DualShock control pad, and its main controller suggested a magic wand crowned by a glowing orb. The sphere was an active LED marker that emitted colored light along a spectrum to contrast with its environment and allow position detection by the PlayStation Eye. This camera added a location-tracking feature and some visual recognition capability to a magnetometer, a combination that prevented confusion when the device was pointed away from the TV screen or when the camera lens was blocked. As with the Wii Remote, the PlayStation Move's inertial motion sensing was also based on accelerometers and Bluetooth information exchange with the console. This controller is still compatible with the Sony PlayStation 4 Camera.

Microsoft joined the trend toward motion control through a controller-free entertainment system consisting of an add-on peripheral for the Microsoft Xbox 360, Microsoft Xbox One, and PC, the Kinect—a product line discontinued between 2015 and 2017. A camera projecting infrared light sensed depth, and its sensors enabled it to see in three dimensions under ambient light conditions, allowing software to perform advanced motion recognition, facial recognition, and voice recognition. The system created a direct interaction between the users and the console through a natural user interface, spoken commands, or presented objects and images, even eliminating the need for a handheld game controller.

Vincent Mauger

See also: Controllers; Generations of Technology

Further Reading

Kitagawa, Midori, and Brian Windsor. *MoCap for Artists: Workflow and Techniques for Motion Capture*. Burlington, MA: Elsevier/Focal Press, 2008.

Liverman, Matt. *The Animator's Motion Capture Guide: Organizing, Managing, and Editing*. Hingham, MA: Charles River Media, 2004.

Meunier, Nathan. "Interview with Reuben Langdon, Video Game Motion Capture Renaissance [*sic*] Man." Cheat Code Central, April 16, 2009. Available at http://www.cheatcc.com/extra/interviewmocapreubenlangdon.html.

Motion Control. *See* Motion Capture and Motion Control

MUDs. *See* Multiuser Domains

Multi Emulator Super System. *See* MAME

Multiple Arcade Machine Emulator. *See* MAME

Multiuser Domains (MUDs)

Multiuser domains (MUDs), also known as multiuser dungeons or multiuser dimensions, are online worlds in which multiple users can interact together simultaneously, usually through text (MUDs differ from bulletin board systems (BBSs) because of their real-time nature). Although many MUDs are not games, their structure, which allows multiple-user interaction in real time, were sometimes used to build games, and these games became the starting point for the development of massively multiplayer online role-playing games (MMORPGs).

In 1978, Essex University student Rob Trubshaw wrote the first MUD, *Multi-User Dungeon*, on a DEC PDP-10 mainframe computer. Trubshaw turned the program over to fellow student Richard Bartle, who continued developing it, and in 1980, it became the first online role-playing game (RPG) when Essex University became connected to ARPANET. Other MUDs followed during the 1980s, including AberMUD (1987), TinyMUD (1988), LPMud (1989), and DikuMUD (1990). Many of these had "descendants," other MUDs that were variations using the same or modified software. A MUD in which object-oriented programming is used is called a MOO (MUD, object oriented), and other terms playing on the original MUD also appeared, such as MUSH (multiuser shared hallucination) and MUCK (multiuser construction kit). In some MUDs, such as TinyMUD, users could build onto the MUD, adding rooms, although some MUDs only gave advanced users these capabilities.

As MUDs grew in popularity, some were set up as commercial online games. In 1983, Alan E. Klietz ported his game *Milieu* to an IBM XT and renamed it *Scepter of Goth*, making it the first commercial MUD in the United States—and an influence on many other commercial MUDs that followed. The game combined single-player text adventure games with the Dungeons & Dragons (1974) tabletop game, resulting in a fantasy-themed text adventure world that up to sixteen simultaneous users could play together. Around the mid-1980s, some MUDs appeared that used graphics, such as *Islands of Kesmai* (1985), which appeared on CompuServe, and Lucasfilm's *Habitat* (1986). Although mostly text based, *Islands of Kesmai* included a small, scrolling graphical representation of a portion of its game world made from ACSII characters (e.g., brackets ([]) represented a wall, a backslash (/) represented a door, and alphabet letters represented the positions of player characters). *Habitat*'s graphics were larger and pictorial, with avatars that looked like cartoon characters and rooms that cut screen to screen.

With the rise of home computers and more and more players coming online, the demand for online games grew, and after the appearance of large-scale graphical-based online role-playing games (beginning with *Meridian 59* [1995]) that could handle thousands of players, the majority of online RPG players moved to the increasingly larger worlds offered by MMORPGs. However, despite the popularity of MMORPGs and graphical games in general, an audience for MUDs still remains. As of late 2019, the MUD Connector website listed information on

683 MUDs, many of which can be still played online.

Mark J. P. Wolf

See also: Online Games

Further Reading

Bartle, Richard. “Hearts, Clubs, Diamonds, Spades: Players Who Suit MUDs.” 1996. Available at http://www.mud.co.uk/richard/hcds.htm.

The MUD Connector website. Accessed October 3, 2020. Available at http://www.mudconnect.com.

Museum of the Game (MOG)

The Museum of the Game (MOG) is the world’s largest educational center that focuses on the art, inventions, science, and history of the video game, game, amusement, and coin-operated machine industries. Its coverage includes video games, pinball, mechanical and electromechanical arcade games, slot machines, vending machines, trade stimulators, and all other coin-operated devices.

Based in Pasadena, Los Angeles County, California, the MOG is provides content and community services related to these machines and protects, researches, and disseminates related knowledge, educational research, and the interpretation of the same. To that end, over more than three decades, it has assembled one of the world’s leading archives covering the art, entrepreneurs, inventions, and history of the amusement and coin-operated machine industries.

One of the key offerings of the MOG is an extensive and growing physical library. Additionally, more than 120,000 pages of educational, research, and entertainment content are available on its website, including more than 100,000 pages of reference content in Acrobat PDF format and more than 20,000 encyclopedia entries covering coin-operated arcade and amusement machines. Other online offerings include a “Machine of the Moment” and message boards where collectors and fans can ask questions and get answers from experts or buy and sell games, machines, and parts. The website receives millions of page views each month. A video game division of the museum called the Killer List of Videogames (KLOV) has created the authoritative database on coin-operated video games; it includes thousands of entries of game descriptions, machine photos, trivia, technical data, and related information.

One of the MOG’s goals is to establish a definitive collection of important mechanical amusement devices, coin-operated machines, and video games for enjoyment and education purposes. The collection currently encompasses approximately one thousand machines and tens of thousands of location photos, catalogs, flyers, and items of related memorabilia. A key focus of this collection is documenting key moments in innovation and the evolution of game design, particularly from the 1880s through the present.

The permanent collection includes the three earliest coin-operated arcade games ever made, the world's first kiddie ride, numerous video game prototypes, and thousands of photos, flyers, catalogs, and related items of memorabilia. Its holdings include the only complete collection of *Computer Space* (1971) specimens, including the only white unit ever made (a prototype).

The collection's machines and select resources are presented by Penny Arcadia, the MOG's events and exhibitions wing. The Penny Arcadia project was initiated in the spring of 1970 by Jon and Patricia Gresham. These efforts culminated in the grand opening of Penny Arcadia on July 17, 1982, in Pocklington, England, twelve miles east of York. It presented a unique combination of expo, museum, theater, arcade, and magic show. It quickly won a Certificate of Merit award from the British Tourist Authority in its Come to Britain Competition. In 2003, the International Arcade Museum and its director, Greg McLemore, took over the operations of Penny Arcadia and moved the collection to Los Angeles, combining it with the machines he had already assembled there.

The MOG also sponsors the International Arcade Museum Library, Inc. (IAML), a 501c3 nonprofit research library that collects and makes available research material related to the amusement, arcade, coin-operated machine, and video game industries, both from its own collection as well as from other libraries and institutions and the collector community. The IAML's goal and purpose is to acquire, preserve, and present a leading archive of catalogs, flyers, photos, obsolete patents, inventions, media, general history, and artifacts about the amusement, arcade, coin-operated, and video game industries. The library works with both the public at large and other libraries, museums, and educational institutions to preserve artifacts and knowledge so that this history is better known, understood, and appreciated. It is currently expanding, preserving, and cataloging its holdings as well as presenting them to the public (both online and via a physical library) and working to develop educational programs. A pool of funds is also being developed to support a move to larger facilities to facilitate expanded presentation and research space and to support being open to the public at regularly scheduled hours. Donations to the library are tax deductible. The International Arcade Museum Library is independent of, yet receives some sponsorship and support from, the International Arcade Museum.

Another institution sponsored by the MOG is the Vintage Arcade Preservation Society (VAPS), also known as the Video Arcade Preservation Society, a leading worldwide association and census project dedicated to the preservation of coin-operated games.

In 2002, The International Arcade Museum was formed to bring together the KLOV, Penny Arcadia, and VAPS. Ten years later, the Museum of the Game was formed to add non-coin-operated video games to the mix.

Greg McLemore

See also: Archives; Preservation

Further Reading

International Arcade Museum Library website. Accessed October 3, 2020. Available at http://www.arcade-museum.com/library.

Museum of the Game (and International Arcade Museum) website. Accessed October 3, 2020. Available at http://www.arcade-museum.com.

Penny Arcadia website. Accessed October 3, 2020. Available at http://www.arcade-museum.com/penny-arcadia.

Vintage Arcade Preservation Society (VAPS). Accessed October 3, 2020. Available at http://www.vaps.org/.

Music

The history of music and video games is also a history of diverse platforms and their technological features, commercial circumstances, and forms of usage. Subsequently, each platform provides specific opportunities, challenges, and requirements when it comes to the use of music as design element in their respective games. Nevertheless, there are some major milestones that had an impact on the use of music in games in general, shaping technological as well as compositional approaches and ideas about game music aesthetics.

HISTORY

It was Tomohiro Nishikado's arcade game *Western Gun/Gun Fight* (1975) that featured a short melodic line for the first time: the death of a player's avatar was accompanied by a monophonic version of Chopin's iconic "Funeral March" melodic line. Also, for other early arcade games, the use of classical music was common, as it was available for free and made employing a composer unnecessary. The music had to be written in code for the machine's programmable sound generator (PSG); therefore, it was usually created by a programmer. First-generation home consoles such as the Magnavox Odyssey (1972) did not have the capabilities for music, whereas second-generation devices such as the Fairchild Channel F (1976), the RCA Studio II (1977), and the Atari VCS (or Atari 2600, 1977) with its Stella/TIA chip could produce sounds and monophonic melodies. Nevertheless, it is Taito's arcade title *Space Invaders* (1978), also created by Nishikado, that is credited for being the first game featuring a continuous soundtrack that changes with gameplay, thereby paving the way for the idea of what became known as dynamic, reactive, adaptive, or interactive music. Two years later, the first game accompanied by a continuous polyphonic loop, the arcade maze racing title *Rally-X* (1980), was released.

During the early and mid-1980s, the introduction of FM synthesis, made possible by Yamaha's sound chips and FM synth boards that were built in Japanese arcade machines and home computers, allowed for more complex chiptune compositions. At the same time, the 8-bit tunes of Nintendo Entertainment System (NES)/Famicom games and game series such as *Dragon Warrior/Dragon Quest* (Koichi Sugiyama), *Super Mario Bros*. (Koji Kondo) and *Final Fantasy* (Nobuo Uematsu) set standards for what players came to associate with game music on consoles, especially in the Western Hemisphere. Besides the quality of the music and the ways it was used as a design element in the games, as well as the creative use of the consoles' sound capabilities, the dominant market position of Nintendo at that time may also have played a part.

Meanwhile, in the realm of home computers, machines such as the Apple II; the Sinclair ZX Spectrum; the Commodore 64, with its famous Sound Interface Device (SID); and the Amiga series became affordable for private users and gathered their own fan bases because of their distinct sound aesthetics. Composers such as Rob Hubbard (e.g., *Monty on the Run* [1985]), Martin Galway (e.g., *Daley Thompson's Decathlon* [1984]), and Chris Hülsbeck (e.g., *The Great Giana Sisters* [1987]) used not only their musical but also their masterly programming skills to coax seemingly impossible sounds out of the given hardware. Thanks to home computers being open and programmable systems, players at the same time started to create their own games or hacked the copy protection of commercial titles. Cracked games were marked with an intro, a short program that started before the game, and oftentimes contained computer music. From this practice, both the demoscene and the musical genre of chiptunes, outside of the games themselves, emerged. Although commercial music programs such as the Commodore Music Maker (1982) were released, they were hard to handle and too inefficient for creating games or demos; therefore, the community started to develop their own tools. In 1986, Chris Hülsbeck released his *Soundmonitor* program as a type-in listing in the German computer magazine *64er*, making music creation on the Commodore 64 much easier.

Another beloved instrument of chiptune musicians, due to its distinct sound, was the Nintendo Game Boy, released in 1989. With this device, polyphonic melodies came to handheld gaming. Earlier LED and LCD handheld electronic games, released by companies such as Mattel Electronics (e.g., *Auto Race* [1976], the first all-electronic handheld video game), Milton Bradley (e.g., Microvision [1979], the first handheld system using interchangeable cartridges), and Nintendo (e.g., their Game & Watch series [1980–91]), had produced sounds and sometimes very brief monophonic melodic lines using piezoelectric speaker beepers.

During the mid-1980s and early 1990s, the capacities of 16-bit home computers and consoles, the wider adoption of FM synthesis, and the introduction of MIDI (Musical Instrument Digital Interface protocol) allowed for new approaches and sound aesthetics. Though General MIDI (which was already introduced in 1982) was limited to 128 instruments, it became possible for composers to create music without having to handle programming languages themselves or rely on a programmer. However, the final sound of the music now strongly depended on hardware playback devices, which was not a problem on consoles, with their standard features. On a home computer, though, composers could never be sure how their creations would sound. Nevertheless, MIDI also allowed for new approaches in terms of flexible implementation. A major milestone was the iMuse (Interactive Music Streaming Engine) that Michael Z. Land and Peter Connelly had created and used in LucasArts' point-and-click-Adventure *Monkey Island 2: LeChuck's Revenge* (1991). It included two crucial innovations. First, iMuse allowed for the flexible use of musical transitions between two pieces of music to produce a seemingly continuous soundtrack. Second, iMuse could create small variations in the music mix to give the impression that the music responded to the player's actions. These two basic principles became known as horizontal resequencing and vertical reorchestration. In terms of sound aesthetics, it was mainly SEGA and its 16-bit console, SEGA Genesis/SEGA Mega Drive, that took advantage of the new possibilities. As the machine's Yamaha YM2612 sound chip could mimic typical progressive rock keyboard sounds, composers created driving soundtracks in that very style. In 1986, the SEGA arcade racing game *Out Run* entered game music history by being the first arcade game that allowed users to choose the soundtrack (the composer was Hiroshi Kawaguchi). The game's music later became a major inspiration for the mid-2000s electronic music genre known as Synthwave, Outrun, or Retrowave.

The Panasonic 3DO Interactive Multiplayer console, which hit the market in 1993 but flopped due to its high price of $699, was the platform for which Sid Meier and Jeff Briggs released their notable music-generating program *C.P.U. Bach* (1993). Based on the user's input, it generated Bach-styled pieces for various instruments. It was Sony's PlayStation (1995) with its CD-ROM drive that became the next game changer in terms of music. Besides MIDI, the console allowed for Red Book Audio in CD quality. While having several advantages (such as better sound quality), Red Book Audio also came with several downsides, most notably a setback in terms of flexibility; hard cuts between tracks and rapid fades were among the consequences. Nevertheless, composers could now make use of vocals and all instruments. In 1996, Sakura Taisen already featured some orchestral parts, and both *The Lost World* (1997) as well as *Heart of Darkness* (1998) featured a full orchestral score. While the soundtrack for the latter had been recorded earlier, the game's release was delayed so that it was published after the former.

The PlayStation also became a playground for music game designers. In 1996, Masaya Matsuura's rapping game *PaRappa the Rapper* helped start the music game genre in Japan. With Jaron Lanier's *Moondust* (Commodore 64, 1983), Toshio Iwai's *Otocky* (Famicom, 1987; never released outside Japan), and Lucasfilm Games' *Loom* (1990), music game predecessors made creative use of a digital games' specific opportunities for involving the player in music creation. But it was *PaRappa* that started the music game boom, together with Konami's arcade music game *Beatmania* (1997). The smashing success of *Beatmania* institutionalized Konami's music game division, Bemani, which produced hit arcade music games and series, including the *Beatmania* series, the *Guitar Freaks* series, and the *Dance Dance Revolution* series. *Dance Dance Revolution* (*DDR*) (1998) was also released in 1999 in North America and in Europe (under the name *Dancing Stage*) and spawned a vital player community.

Despite *DDR*'s success, the genre of music games sustainably hit the Western Hemisphere in the form of *Guitar Hero* (2005) for the PlayStation 2. The game was inspired and strongly influenced by its Japanese predecessors in terms of design. Besides its outstanding commercial success, *Guitar Hero* was celebrated, and at the same time infamous, for its influence on the music market and relations with the music industry. Whereas some musicians and groups came to light thanks to their songs being licensed for the game, others went through their second commercial springtime due to a dedicated *Guitar Hero* title (e.g., Metallica and Aerosmith), and still others declined a deal (e.g., Led Zeppelin), as they felt it to be a sellout of their music; they called on players to pick up a real guitar instead. Such interrelationships and cross-marketing approaches were nothing new by this time; bands had been involved since *Journey Escape* (1982) for Atari VCS was released.

Throughout video game history, stars with backgrounds in all kinds of musical genres have been involved with video games, composing the music for games or even appearing in games as a character or as themselves, including Michael Jackson (several SEGA games, such as *Michael Jackson's Moonwalker* [1990] and *Space Channel 5* [1999]); David Bowie (*Omikron: The Nomad Soul*, [1999]); 50 Cent, Dr. Dre, and Eminem (*50 Cent: Bulletproof* [2005]); Phil Collins (*Grand Theft Auto: Vice City Stories* [2005]); Brian Eno (*Spore* [2008]); and Ozzy Osbourne, Lemmy Kilmister, Lita Ford, and Rob Halford (*Brütal Legend* [2009]).

Today, technology allows for all kinds of musical styles, aesthetics, and genres. Nevertheless, there are constraints to available options and a composer's creative freedom. These include a game's genre and the subsequent player expectations for a suitable soundtrack, the available budget, the ideas and specifications given by publishers or developers, and time constraints or the circumstances of involvement in a game project. With few exceptions (such as Konami's Bemani division), composers are usually not permanently employed at game companies; instead, work for hire is common. This practice, plus sometimes restrictive nondisclosure agreement clauses, has consequences for the creative process. Some composers report getting only some artwork from, and minimal information on, the game for which they are composing as well as vague directions as to what kind of music is expected. Optimally, composers should be brought into a project at an early stage; be given enough information to tailor the soundtrack precisely to the game, its gameplay, and game feel; and be involved in implementing the soundtrack into the game, as these are, besides compositional quality, other key elements in creating an overall satisfying gameplay experience for the player.

PRODUCTION

Game music is oftentimes compared to film music. There are, indeed, similarities in the way music is used as a design element to meet certain audience expectations (what kind of music fits a specific scene or event), which are oftentimes established by other media, such as film or television. For this reason, techniques deriving from the field of film scoring are also used in games. Common approaches are Mickey Mousing (synching the music with the actions on screen), underscoring (background music that helps to establish the mood of a scene), mood technique (music that reflects or reveals the feelings of a character on screen), or the use of leitmotifs (derived from opera, establishing a motif as the musical representation of a character, relationship, narrative thread, etc.).

A major difference between a game and a film score is that a game soundtrack must allow for flexible implementation. Whereas a film presents an unchangeable sequence of events for which a film composer creates a score, a game composer cannot foresee what a player will do at what point. Additionally, a player's reactions can rely on musical cues or motifs; besides a merely narrative function, music in games can deliver gameplay-relevant information, aiding the player's decision as to what to do or not do. In any case, the music has to fit whatever event will be the consequence. To achieve this goal, technological solutions as well as specific compositional strategies have emerged, such as branching, layering, using a transition matrix, parallel composing, or using forms of procedural audio.

Branching means that a piece of music is split into different layers. If a certain event happens, individual layers can be muted or replaced by another version. These changes are determined by so-called cues or custom markers. Likewise, the nature of the transition must be defined. A similar technique is *layering,* but only one layer is added or muted, for example, a single instrument. When using branching or layering, the composer must make sure that all layers sound good with the rest of the music and sound effects at any time. Another method is the *transition matrix*: The composer writes several short pieces of music and a series of transitions; it must be possible to jump, in a musically meaningful way, from any piece to any other piece of music by using the appropriate transition pieces. Transitions can take place at different points (e.g., immediately, at the end of a phrase, or with a set custom marker) as well as in various ways (e.g., crossfade, fade in and fade out). *Parallel composing* means writing a longer piece of music as well as other tracks with the same basic musical parameters (e.g., key, tempo) but in a different mood. During play, one track is replayed, and the others are muted until a defined game event triggers a switch to another track. The goal is to allow the seamless interchange between these tracks at certain points without using additional transitions. This means that during the compositional process, any change in a track must be traced in all parallel tracks. Another option involves forms of procedural audio created, for example, by using Markov chains. The music is then generated in real time by the computer on the basis of predefined rules.

Besides hiring a composer to create an original soundtrack, other ways to include music in a game are licensing existing music or using free tracks from music libraries.

RECEPTION AND CULTURE

Since the late 1970s, game tunes have not just been heard during gameplay; instead, the sounds and music were reused within diverse cultural artifacts and practices, appearing in other media forms and musical genres.

In 1979, the single release “Computer Game/Firecracker,” from the album *Yellow Magic Orchestra* by the eponymous Japanese computer music group, started with arcade game music from titles such as *Gun Fight* (1975). The song became a major hit, selling four hundred thousand copies in the United States alone and had a major influence on emerging musical genres such as hip-hop, electro, and early techno. The first pop title that included original game music was “Space Invaders” by the Australian group Player One, also in 1979. In December 1981, the single release “Pac-Man Fever,” from the eponymous concept album (1982) by Buckner & Garcia, was released and sold more than one billion units in the United States alone.

Furthermore, games and their music were also present in TV shows, commercials, and 1980s movies of all types, such as *Tron* (1982), *Koyaanisqatsi* (1983), *War Games* (1983), *The Karate Kid* (1984), and *The Last Starfighter* (1984).

In TV commercials, especially high-grossing hit titles such as *Pac-Man* (1980) or *Super Mario Bros.* (1985) were used to either advertise branded products such as the Nintendo Cereal System or thematically matching items such as food or soft drinks. In 1989, *The Super Mario Bros. Super Show!* aired on TV, featuring Lou Albano as Mario and Danny Wells as Luigi. It was a mix of live-action segments plus *Super Mario* and *The Legend of Zelda* cartoons. Its theme song ("The Plumber Rap") and the outro ("Do the Mario") were rap versions of the famous *Overworld* theme, including several sound effects from the game.

Though never completely out of the picture, especially since the mid-2000s, retro game aesthetics have resurfaced in broader pop culture, for example, in the aforementioned Synthwave music genre. More and more musicians started to use and reuse sounds and music from early games in their songs or albums or create music drawing on 8-bit and 16-bit sound aesthetics. Additionally, entire gaming-themed movies, such as *Scott Pilgrim v. the World* (2010), *Wreck-It Ralph* (2012), and *Pixels* (2015), feature the typical "golden era" 8-bit aesthetics and associated sound.

In Japan, game music had occupied a far more important place by the 1980s. In 1984, the first album was released by Alfa Records. It contained the original music of successful Namco arcade titles such as *Galaga* (1981), *Dig Dug* (1982), and *Xevious* (1982). The producer was Haruomi Hosono, a member of Yellow Magic Orchestra. Due to the album's huge success, a second album featuring music from *Super Xevious* (1984) was released the same year. By 1986, the heyday of Nintendo's Famicom, twenty-seven game music albums had been published. The same year, Obi Kazusuke, a former producer of Yellow Magic Orchestra, founded the first label exclusively dedicated to game music and chiptunes, G.M.O. Records, which was an imprint of Alfa Records. Subsequently, the number of game music releases increased significantly. Additionally, magazines such as *Beep* and *Gamest* covered the topic of game music, offering instructions on how to record arcade music on-site and promoting so-called SoundTeams, such as Taito's Zuntata or SEGA's S.M.T. Team, who performed their music live, including at the first Game Music Festival in 1990. The magazines further included sheet music or sometimes even flexidiscs (sonosheets) that contained game tunes and could be played on phonographs.

In 1987, the first orchestral live performance of game music took place in Suntory Hall in Tokyo. Conducted by composer Koichi Sugiyama, "*Dragon Quest I* Symphonic Suite" and "*Dragon Quest II* Symphonic Suite" were performed by the Tokyo Strings Ensemble alongside Camille Saint-Saëns "Le Carnavale des Animaux." The concert recording was released the same year. The first commercial game music concert outside Japan took place sixteen years later, in the Gewandhaus, Leipzig. Produced by Thomas Böcker, the "Erstes Symphonisches Spielemusikkonzert" was part of the official opening ceremony of the Games Convention trade fair. Since then, orchestral game music performances have taken place all over the world, as special performances by a standing orchestra, in the form of dedicated tour productions or as anniversary concerts.

Beyond orchestral concerts, fans perform game music using all kinds of instruments and materials, creating their own tributes, game filk songs, and mash-up videos. Video platforms such as YouTube and Nico Douga contain uncountable videos of such cultural fan activities.

All these phenomena and their history have become the subject of the developing academic field of ludomusicology, the study of video game music in games and related contexts.

RESEARCH

The neologism *ludomusicology*, coined by Guillaume Laroche in 2007, is composed of the words *ludology* and *musicology*. First, ludomusicological research deals with the history, aesthetics, and practice of music as a design element in games; the specific genre of music games; cultural effects such as fan culture and its social practices; the development of a distinct orchestral performance culture; and the further processing and interaction with other media forms or musical genres. Second, ludomusicology aims to expand the perspective of musicology: beyond the hitherto predominant text paradigm, which places emphasis on score analysis, music is understood and analyzed as a playful practice. Third, there are also musical-pedagogical considerations, for example, to what extent (music) games and various forms of playful approaches can promote the learning of musical skills. All these topics are approached from multiple perspectives that focus on the technological, cultural, aesthetical, or compositional developments of diverse game genres. Additionally, overarching theoretical approaches and a suitable terminology for analysis are developed and discussed.

Following some early articles and books, the number of anthologies and monographs dealing with the specific subject of game music has been steadily increasing since 2012. Furthermore, since the foundation of the first Ludomusicology Research Group in 2011, ludomusicologists have started to organize conferences, build subgroups within musicological societies, and engage in lively international and interdisciplinary exchange. In 2016, the international Society for the Study of Sound and Music in Games was established as a head organization.

As the field is relatively new and as most researchers are by now located in English-speaking countries, such as the United States, the United Kingdom, and Australia, as well as in Europe, game music history usually mainly focuses on games from North America, Europe, and Japan. Unearthing and documenting other game music histories and looking more closely at diverse national developments are among the major tasks that still need to be undertaken by ludomusicological researchers.

Melanie Fritsch

See also: Emotion; Sound

Further Reading

Austin, Michael, ed. *Music Video Games: Performance, Politics, and Play*. New York: Bloomsbury Academic, 2016.

Collins, Karen. *Game Sound: An Introduction to the History, Theory, and Practice of Video Game Music and Sound Design*. Cambridge, MA: MIT Press, 2008.

Fritsch, Melanie. *Performing Bytes. Musikperformances der Computerspielkultur*. Würzburg, Germany: Königshausen & Neumann, 2018.

Kamp, Michiel, Tim Summers, and Mark Sweeney, eds. *Ludomusicology: Approaches to Video Game Music*. Sheffield, England: Equinox, 2016.

Kohler, Chris. *Power-Up: How Japanese Video Games Gave the World an Extra Life*. Mineola, New York: Dover Publications, 2016.

McAlpine, Kenneth. *Bits and Pieces: A History of Chiptunes*. New York and Oxford, UK: Oxford University Press, 2017.

Phillips, Winifred. *A Composer's Guide to Game Music*. Cambridge, MA: MIT Press, 2014.

Summers, Tim. *Understanding Video Game Music*. Cambridge, UK: Cambridge University Press, 2016.

Van Geelen, Tim. "Realizing Groundbreaking Adaptive Music." In *From Pac-Man to Pop Music: Interactive Audio in Games and New Media*, edited by Karen Collins, 93–102. Farnham, England: Ashgate Publishing, 2008.

Yamakami, Yôhei, and Mathieu Barbosa. "Formation et développement des cultures autour de la 'Geemu ongaku' (1980–1990)." *Kinephanos. Revue d'études des médias et de culture populaire* 5, no. 1 (2015). Available at http://www.kinephanos.ca/2015/geemu-ongaku/.

Music Games. *See* Music; Rhythm and Dance Games

Myst

Cyan's *Myst* (1993), a point-and-click adventure game, held the title of best-selling video game of all time from 1993 until 2001, when it was passed up by *The Sims* (2000). *Myst* was not only responsible for a flood of imitations in the years that followed its release, but it was also the game that inspired the sales of computers with CD-ROM drives and promoted the advance of CD-ROM-based games in general. *Myst* raised the bar for graphics (considered photo-realistic at the time), world-building, deep space staging, location-based ambience, and immersive gameplay and was a crossover game appealing to men and women and audiences of all ages.

Myst's world was made up of more than twenty-five hundred screens of pre-rendered three-dimensional graphics, representing the views of Myst Island and several Ages, or lands, that players traveled to through the use of linking books, which acted as portals from one location to another. With an unhurried, contemplative pace, players began on Myst Island with no objective other than exploration and learning how various machines worked. As players connected clues, they gained access to new locations, where details would further reveal information pertaining to the storyline embedded in the game. The locations also contained red and blue pages that could be collected and deposited in the Myst Island library, where two characters, Sirrus and Achenar, addressed the player from books, revealing more information about their situation and that of Atrus, their father. In the end, having collected information and pieced together the story of what had happened, players were faced with making a final decision that would determine which one of four endings would occur. Many of the puzzles in *Myst* were environmental in nature, requiring an understanding of the game world's geography, with actions that sometimes had consequences for another area of the game. *Myst* was designed to take about forty hours of gameplay to be solved.

Myst's success was followed by three novels, a board game, and a series of sequels, including *Riven* (1997), *Myst III: Exile* (2001), *Uru: Ages beyond Myst* (2003), *Myst IV: Revelation* (2004), and *Myst V: End of Ages* (2005). *Myst* would twice undergo revision and rerelease, appearing with enhanced graphics and sound and a "DigitalGuide" hints feature, as *Myst Masterpiece Edition* (1999) and *realMYST* (2000), which rendered its three-dimensional graphics in real time as the player's point of view moved smoothly through its spaces and for which new models of everything were generated using the original *Myst* models for reference. Finally, *Myst* was rereleased again as part of the *Myst 10th Anniversary DVD Edition* (2003), and versions were released for iOS, Android, Nintendo DS, PlayStation Portable (PSP), and other systems.

Today, *Myst* remains an influential game both in the adventure game genre and in the history of video games in general, showing that games need not be fast paced or violent to be successful.

Mark J. P. Wolf

See also: Cyan Worlds

Further Reading

Wolf, Mark J. P. *Myst and Riven: The World of the D'ni*. Ann Arbor: University of Michigan Press, 2011.

N

Namco

In 1955, Masaya Nakamura set up the Nakamura Manufacturing Company to operate and maintain two secondhand coin-operated mechanical horse rides for children in the roof garden of a department store in Tokyo, Japan (Kent 2001, 74). The company, the name of which was shortened to Namco, grew in the next two decades and manufactured and operated its own coin-operated amusement rides (Kohler 2004, 15). Its foray into the video game industry began when Atari started shipping *PONG* (1972) machines outside of the United States in 1973. Atari opened up a Japanese branch to oversee importation and distribution of its arcade games, and Namco was among its Japanese clients. Because of market difficulties, the independently operated Atari branch was sold off to Nakamura in 1974, and Namco became Atari's chief distributor in Japan.

Atari's first major hit in Japan came in 1976 when Namco began distributing *Breakout* (1976). The wildly successful game became the subject of a counterfeiting ring operated by the Yakuza. A disagreement between Nakamura and Atari's Nolan Bushnell on how to respond to the illegal machines resulted in Namco terminating its relationship with Atari to go into business for itself (Kohler 2004, 77).

In 1979, Namco employee Toru Iwatani set out to make a nonviolent game centered around eating. Drawing his lead character from a pizza with a slice removed and his enemies from cute ghosts designed to appeal to women, Iwatani and his nine-man team created a game about eating dots in a maze. Soon, *Pac-Man* (1980) became Namco's first global success and marked the company as forerunners in the burgeoning arcade game industry. Other notable Namco games of the golden age include *Galaga* (1981), *Dig Dug* (1982), *Xevious* (1982), and *Pole Position* (1982).

Although the company changed ownership and subsidiaries numerous times over the three decades following *Pac-Man*, the Namco name remained a fixture of the industry. Namco continued to make arcade games throughout the 1980s and ported its most successful games to home consoles. In the 1990s, Namco reclaimed its spot in the popular imagination by bringing its games to the Sony PlayStation; the arcade hit *Ridge Racer* (1993) was one of the most popular early PlayStation games. The continued popularity of arcades in Japan led Namco to continue designing arcade games into the 2000s and the establishment of series such as *Soulcalibur*, *Tekken*, and *Time Crisis*, which have spawned numerous sequels. Other popular Namco game series include the quirky ball-rolling *Katamari* games, the fifteen-plus titles in the *Tales* role-playing game (RPG) series, games based on popular anime, and the *Dark Souls* series of games.

In 2005, Japanese toy company Bandai acquired and merged with Namco, forming a new parent corporation Bandai Namco Holdings Inc. The company continues to publish games for home consoles, computers, and mobile devices as Namco Bandai Entertainment, while the arcade and redemption game division operates under the name Bandai Namco Amusement Inc.

Bobby Schweizer

See also: Japan; *Pac-Man*

Further Reading

Kent, Steven. *The Ultimate History of Video Games: From Pong to Pokémon and Beyond*. Roseville, CA: Prima Publishing, 2001.

Kohler, Chris. *Power-Up: How Japanese Video Games Gave the World an Extra Life*. Indianapolis, IN: Brady Games, 2004.

Szczepaniak, John. *The Untold History of Japanese Developers*. Vol. 1. n.p.: SMG Szczepaniak, 2014.

Narrative

Narrative theory grew to prominence with the rise of structuralism in the early 1960s, under inspiration from Russian formalists such as Vladímir Propp. In the traditional description, a *narrative* is the structured presentation of a *story* (a fixed sequence of events) by way of a *discourse* (Chatman 1978). It is common for narratives to present their story events in nonchronological order, and reading a novel or watching a movie generally involves reconstructing a story on the basis of the discourse presented.

In terms of *content*, narratives tend to deal with the experiences of human or anthropomorphic entities that have emotions and beliefs (Fludernik 1996). The content of a narrative is usually governed by a principle of coherence and economy in which events follow causally from each other, and we expect the narrator to mainly communicate information that is relevant to the development of the story. Some contemporary writers use narrative in a very broad sense (Bhabha 1990) or claim that narrative structures underlie all human thought (Schank and Abelson 1977), but for the purpose of studying video games, considering narrative in a narrow sense is more productive because it yields more precise critical tools.

The relationship between video games and narrative has been the subject of continued debate in video game studies. The two extreme viewpoints on the issue are commonly referred to as the *narratological* argument that games are (or should be) narratives and the *ludological* argument that games are fundamentally distinct from narratives. On the far end of the narrative side of the spectrum, Janet Murray suggests that computers and gamelike structures are a new medium for storytelling (Murray 1998, 11). At the other end of the spectrum, Markku Eskelinen claims that any association of video games with narratives is fundamentally flawed because people generally have no difficulty distinguishing between narrative and gaming situations (Eskelinen 2004, 36).

There is a risk that such a discussion becomes too general to be useful, but from the distinction between discourse and story, it follows that the role of narrative in games can be examined in more detail from either the perspective of game structure or from the perspective of game content.

GAME STRUCTURE AND NARRATIVE STRUCTURE

In the traditional sense of the term, a narrative presents a series of fixed events. This makes it straightforward to pose the fundamental argument that because games by definition must have variable outcomes, they are always nonfixed series of events and therefore fundamentally nonnarrative (Juul 2001). The simplest way of dealing with this contradiction in game design has been to develop branching narratives as found in the *Choose Your Own Adventure* book series (Packard and Montgomery 1979–present). From a theoretical point of view, this approach requires that we extend our concept of narrative to include some element of openness and nonlinearity, which raises the question of whether a branching narrative can maintain the coherence and economy of a linear narrative. From a practical point of view, it also threatens the developer with a combinatorial explosion of branching points to give players agency.

Although some modern video games contain branching narratives, video game history has led to the development of two central methods through which games can retain their interactivity while still presenting a series of predetermined events. First, many single-player video games let the player complete a predefined sequence of challenges. Within the individual challenge, the player is given some amount of freedom, but by completing the game, the player will traverse an overarching predetermined sequence of events. This is the most common method for representing a linear narrative in game form. Second, *environmental storytelling* allows a game to present narrative content by infusing story elements into the physical space of a game or alongside the actions of the players (Carson 2004).

GAME CONTENT AND NARRATIVE CONTENT

In game design literature, Chris Crawford has made the complementary argument that current video games present players with a very restricted number of *verbs* (such as “run,” “jump,” etc.), whereas the protagonist of a proper story has access to thousands of verbs dealing with social interaction, human communication, and so on (Crawford 2003, 165–167). Crawford implores designers to expand the range of actions available to players, but this presents several technical and design obstacles, the main one being that although it is straightforward to implement spatial movement in game rules and computer programming, it is extremely difficult to implement social interaction and especially human language using the same tools. There are five common ways of working around the difficulty of placing story content in games.

First, the traditional method for dealing with the difficulty of implementing human interaction has been to not implement human interaction at all, but rather to represent it in nonplayable cutscenes. Second, *The Sims* (2000) avoids the problem of human language by having characters speak the nonsensical language of “Simlish,” thereby leaving it to players to imagine what is being said in the game. *The Sims* is not a narrative in terms of structure, but its content (the emotional state of characters) is quite similar to the content of many narratives and is easily retold by players. Third, some of the design issues and technical problems of creating character interaction can be circumvented by using settings that limit the player’s expectation toward what characters could or should do, such as dealing with a couple’s marital problems in *Façade* (Mateas and Stern 2005). Fourth, recent games, such as *Dear Esther* (2012), more radically only let players walk, and they reward walking with voiceover narration of the game’s central story. Fifth, smaller experimental text-based games made with the Twine tool, such as *Howling Dogs* (2012), solve the problem by highlighting it, foregrounding the game’s artificial structure, and inviting players to actively engage with the artificialities of game-based narration.

There are substantial barriers to creating games with the typical story content of human behavior and interaction that we expect from traditional narratives. These barriers, however, specifically concern single-player games; multiplayer games are an entirely different matter. By involving humans as players, multiplayer games avoid the problem of implementing human interaction entirely; from a structural point of view, multiplayer games are rarely narratives, but because such games feature humans in the first place, it is easy for players to tell a story *about* a game session. Like in the previous example of *The Sims*, this shows the importance of distinguishing between narrative structure and narrative content.

VIDEO GAMES AND NARRATIVES

The caveat of using narrative theory to examine video games is that it was developed for purposes other than studying video games and therefore does not say anything about video games specifically. Narrative theory can nevertheless be used with caution by identifying what the theory does not explain to see what is unique about video games.

In abstract games, gameplay can provide a type of interest that is independent of narrative; at the same time, the fiction of most contemporary video games helps players understand the affordances of the underlying rule system. For example, players tend to assume that an object that looks like a car can be used for driving (Juul 2005, ch. 5). Finally, games have a unique capacity for building an emotional connection to game events and characters by sharing a journey over the course of a game, such as in Jason Rohrer’s *Passage* (2007) and *Ico* (2001), or by giving players a sense of *complicity* in unpleasant events, as in Brenda Brathwaite’s board game Train (2009).

The discussion of whether video games are narrative was foundational for the field of video game studies. Although the debate occasionally reemerges both in academia and in the game industry, the question is no longer one of yes or no, but one that asks which components of traditional narratives work well in video games and which work less well, how games deal with the import of material from other media, and what video games can and cannot do.

Jesper Juul

See also: Space (Narrative); World (of a Video Game)

Further Reading

Bhabha, Homi K. *Nation and Narration*. New York: Routledge, 1990.

Carson, Don. "Environmental Storytelling: Creating Immersive 3D Worlds Using Lessons Learned from the Theme Park Industry." Gamasutra, March 1, 2004. Available at http://www.gamasutra.com/view/feature/3186/environmental_storytelling_.php.

Chatman, Seymour. *Story and Discourse: Narrative Structure in Fiction and Film*. Ithaca, NY: Cornell University Press, 1978.

Crawford, Chris. *Chris Crawford on Game Design*. Berkeley, CA: New Riders Games, 2003.

Eskelinen, Markku. "Towards Computer Game Studies." In *First Person: New Media as Story, Performance and Game*, edited by Noah Wardrip-Fruin and Pat Harrigan, 36–43. Cambridge, MA: MIT Press, 2004.

Fludernik, Monika. *Towards a "Natural" Narratology*. London: Psychology Press, 1996.

Juul, Jesper. "Games Telling Stories." *Game Studies* 1, no. 1 (2001). Available at http://gamestudies.org/0101/juul-gts.

Juul, Jesper. *Half-Real: Video Games between Real Rules and Fictional Worlds*. Cambridge, MA: MIT Press, 2005.

Mateas, Michael, and Andrew Stern. *Façade*. 2005. Available at http://www.interactivestory.net.

Murray, Janet H. *Hamlet on the Holodeck: The Future of Narrative in Cyberspace*. Cambridge, MA: MIT Press, 1998.

Schank, Roger C., and Robert P. Abelson. *Scripts, Plans, Goals and Understanding: An Inquiry into Human Knowledge Structures*. Hillsdale, NJ: Lawrence Erlbaum Associates, 1977.

Navigation (Spatial)

The graphical nature of video games combined with the tendency toward representational graphics has resulted in the concept of video game spaces that are like miniature worlds. Many games have spaces so elaborate that spatial navigation becomes an important part of gameplay. Navigation is an interaction with space itself, a space through which one actively makes choices to find one's way around. Navigation involves freedom of movement and connected spaces, the connections of which are explored and learned through navigation.

To discuss spatial navigation, we can consider spaces as being made up of spatial cells, each of which is a continuous, Euclidean space that allows noncontingent two-way movement between all possible positions within that space, all of which is contained within boundaries (which may include a barrier regulating movement into and out of the space, such as a wall or doorway; a line of demarcation, such as the line between two countries on a map or between squares on a chessboard; or a technical limitation, such as a screen edge or a cut to another screen). Boundaries divide up the space of a game's world for the purposes of programming it: to separate locations and events; to help players to better conceptualize the game's spaces; and to give a sense of progress and accomplishment as the player moves through, conquers, or completes parts of the game. Such breaks also allow a player to rest between levels, view cutscenes, save games, and so on.

Spatial cells are connected together in configurations that make up a game's world. Connections between spatial cells can be navigable, visible, both, or neither. Navigable connections allow the player character to *travel* from one spatial cell into another, whereas visible connections allow players to *look* from one space into another; some connections, such as windows or locked doors, may allow a player to look into a space without being able to move into it. Likewise, the navigability and visibility of connections can be turned on and off as connections are opened and closed or locked and unlocked. Movement and visibility between two spaces can also be two-way connections, allowing access in both directions, or one-way, in which access is available in one direction but not the other (e.g., one-way mirrors or surveillance monitors that show another space). Connections between spaces can also be implied, without being navigable or visible, such as spaces shown on a map of the game's world.

Connections between spaces can also be contingent (based on a game's state) or noncontingent (always the same, regardless of game state). Connections may also be hidden and only revealed at a later point in the game, when an object, place, or avatar is in a certain state—for example, if a character has a key, if the lights are on, if secret passageways are open (as in the library in *Myst* [1993]), or if a vehicle is summoned (as in *Riven* [1997]). Such connections are not contingent if they always connect to the same place; only those that change their connectivity (what they connect to) based on various game states can be said to be contingent (e.g., an elevator that opens out onto different floors, depending on the position of the elevator, or the user-created portals in *Portal* [2007]). Mapping out all the connections between a game's spaces can be difficult because of hidden and contingent connections and spatial configurations that change over time during gameplay in which connections appear and disappear.

Spatial navigation often relies on the experiences involved in navigating physical spaces, making navigation intuitive and logical. However, spaces may be connected to themselves or to other spaces in such a way that they result in non-Euclidean structures that are physically impossible. Due to their nonintuitive nature, such spaces can complicate navigation, and games that use them often position spatial exploration as an important part of gameplay. Even single spatial cells can be connected to themselves in such a way as to become non-Euclidean; for example, the wraparound screen used in *Asteroids* (1979) forms the surface of a 2-torus—a surface with curves that violates Euclidean consistency. Spatial cells that are themselves Euclidean in nature can also be combined in ways that make the resulting overall structures non-Euclidean, such as the game world of *Adventure* (1979). Connections between spatial cells, however, are not Euclidean or non-Euclidean in and of themselves; only the structures that result from them are Euclidean or non-Euclidean.

In some games, spaces are experienced linearly, resulting in long, gradually revealed, track-like spatial cells, as in many racing games and rail-based shooting games. These spaces may require *steering*, which differs from *navigation* in that the player is merely avoiding obstacles, shooting targets, or keeping to a course or route, whereas the overall direction of movement requires no wayfinding or decision making. Such track-like spaces can themselves be spatial cells that are connected into larger structures. It is also possible to have spatial cells with boundaries that are constantly changing, which means the cells themselves could be growing and shrinking and even coming into existence and going out of existence. In such games, players would have to continually relearn spaces to navigate them; in such cases, only navigation logic may help the player make sense of a game's spaces.

Navigational logic consists of three distinct things players must learn: what spaces exist, how spaces are interconnected (through the learning of boundaries and obstacles), and how interconnections work. In games in which spaces and their connections are changing, the process can be complicated, and a game may be designed to deliberately reject navigational logic, leaving no consistency on which a player can rely. Spatial navigation can also be made difficult by lack of a map, enemy characters who passively block connections or actively attack the player, obstacles that block movement or visibility, lack of time to complete navigational tasks, and narrative sequences that interrupt exploration. Regardless of the degree to which a game employs navigational logic, navigable space remains an important part of gameplay and an essential skill needed by video game players.

Mark J. P. Wolf

See also: Navigation (Temporal); Space (Visual)

Further Reading

Carr, Diane. "Space, Navigation and Affect." In *Computer Games: Text, Narrative and Play*, edited by Diane Carr, David Buckingham, Andrew Burn, and Gareth Schott, 59–71. Cambridge, UK: Polity Press, 2006.

Wolf, Mark J. P. "Theorizing Navigable Space in Video Games." In *Logic and Structure of the Computer Game*, edited by Stephan Günzel, Michael Liebe, and Dieter Mersch, 36–62. Germany: Potsdam University Press, 2010.

Navigation (Temporal)

Although most video games involve aspects of spatial navigation, some also emphasize temporal navigation; in these cases, players must actively control time or maneuver through temporal structures within a game. Games may emphasize temporal navigation as a core game mechanic or merely a feature of play. They may permit players to perform a range of actions, such as slowing time's passage within the game's diegetic world or reversing time to undo mistakes made during gameplay. This ability to alter time is often incorporated into the game's narrative, characterizing the temporal control as a "special power" of the player's avatar or linking it to an object found by the player.

Spatial navigation is a central element of many video games because players must typically maneuver avatars through a game space (as in *Super Mario Bros.* [1985]) or manipulate game elements to achieve predefined results (such as directing the descent of tetrominoes in *Tetris* [1985]). Temporal navigation games often require similar aspects of spatial movement and place an emphasis on traversals and modifications of game temporality. Perhaps the most common adjustments and manipulations of time within a game occur when the player slows time to better navigate the game space in response to enemies and other challenges. The gameplay of Remedy Entertainment's *Max Payne* (2001) employs a feature called "bullet time" that allows the player to selectively slow the movement of time (and thus the movements of enemies) within the game, allowing the player to maneuver more easily and defeat enemies during gun battles. Providing the player with the ability to slow time is not limited to specific games; software "cheats" may allow such functionality. In a similar vein, Nintendo released the NES Advantage joystick in 1987 for the Nintendo Entertainment System (NES), which featured a "slow" button that slowed many NES games through a pause mechanism by repeatedly suspending and resuming games.

Games may allow (and even require) players to maneuver through the temporal structure of the diegetic game world to accomplish specified tasks. Nintendo's *The Legend of Zelda: The Ocarina of Time* (1998) provides players with a musical instrument that permits them to play a number of musical tunes, some of which specifically allow for temporal movement. One song allows the player to switch the game world back and forth between day and night, and another permits the player's avatar to swap between childhood and adulthood (with the game worlds for each being distinct but intertwined spaces). This diegetic temporal exploration is furthered in the sequel, *The Legend of Zelda: Majora's Mask* (2000), and can be found in earlier games, such as Jordan Mechner's *The Last Express* (1997) and Roberta Williams's *The Colonel's Bequest: A Laura Bow Mystery* (1989).

Other games incorporate temporal navigation as a core game mechanic, requiring the player to actively control and manipulate the passage of time during play to successfully complete them. Ubisoft's *The Prince of Persia: The Sands of Time* (2003) uses several such temporal mechanics, which operate as special abilities the player gains related to a weapon called the Dagger of Time. This item allows the player to not only slow the passage of time, much like earlier games, but also to reverse its passage. Thus, the player may essentially rewind time within the game, allowing him or her to revert (in limited fashion) to an earlier moment within the last few seconds of gameplay. This ability permits the player to correct mistakes made during play and is similar to functions found in other titles, such as Artoon's platformer *Blinx: The Time Sweeper* (2002), Saber

Interactive's first-person shooter *TimeShift* (2007), and Remedy Entertainment's *Quantum Break* (2016).

Number None's *Braid* (2008) employs temporal navigation and manipulation in even more complex fashions, furthering the role of time as a game mechanic. Like earlier temporal navigation games, *Braid* uses a mechanic of rewinding time, and subsequent levels in the game emphasize distinct temporal behaviors and manipulations that must be used to solve puzzles, such as linking the passage of time in the game to the player's movements. In this instance, game world time moves forward when the player moves the avatar left to right in the game, pauses when the avatar stops, and reverses when movement is made right to left. Such game mechanics thus expand on existing temporal navigation games, and games such as Dontnod Entertainment's *Life is Strange* (2015) and Superhot Team's *Superhot* (2016) also explore time-based play. Given the relatively recent emergence of games that emphasize temporal navigation, it seems certain that new ones with even more complex and nuanced uses of time will appear in years to come.

Christopher Hanson

See also: Navigation (Spatial); Time

Further Reading

Hanson, Christopher. *Game Time: Understanding Temporality in Video Games*. Bloomington : Indiana University Press, 2018.

NCSoft

NCSoft is a South Korean corporation that specializes in the development of massively multiplayer online role-playing games (MMORPGs). CEO Kim Taek Jin established the award-winning company in 1997. The company gained its high profile a year later, in 1998, when it launched the MMORPG *Lineages*. Since then, it has maintained its preeminence by producing a number of other successful large-scale online games, including *City of Heroes* (2004), *Guild Wars* (2005), *AION* (2008), and *Blade & Soul* (2012), while at the same time developing innovative services in digital platforms for MMORPGs, casual games, mobile games, and character content. In 2018, market-analysis agency Newzoo listed NCSoft as the world's seventeenth-largest global game company according to annual revenue. The company reportedly earned 421,467,650,710 Korean won (USD 356 million) and employed twenty-three hundred employees in 2019.

NCSoft's most notable achievements stem from its vanguard role in opening the new era of online gaming to both South Korea and the world. It managed to thrive amid the country's formerly oligarchical business environment, symbolized by family-owned conglomerates such as Samsung and LG. Thanks to the rapidly growing field of internet business that began in the early 2000s as South Korea transformed into a knowledge-based economy, the company was able to lead the growth of information technology (IT) enterprise in game development. In time, *Lineages* grew to dominate more than half of the content delivery channels serving South Korea's PC bang distribution network, and NCSoft emerged as the country's leading game company. The company continued to attract Korean players with improved three-dimensional graphics, elaborate cinematic visual storytelling, and unique *Lineage*-style gameplay. Although the game is set in the European Middle Ages, the technological features and narrative structure of *Lineages* reflect the current tastes of Korean players. NCSoft has contributed much to shaping a strong gaming community in South Korea as playing *Lineages* with friends became a constant feature of Korean social life.

At the same time, NCSoft successfully expanded its reach internationally. To illustrate, in 2001, NCSoft established its U.S. subsidiary, NC Interactive, in Austin, Texas. Two years later, it acquired American developer ArenaNet, a video game developer that consists of the core development team for both *StarCraft* (1998) and *World of Warcraft* (2004). This encouraged the company to create the *Guild Wars* franchise, which nowadays allows them to sell five million copies worldwide. Moreover, NCSoft expanded into Asia with the commercial launch of *Lineages* in Japan (2001), China (2003), Taiwan (2003), Europe (2004), and Thailand (2004). Along the way, the company teamed up with the Taiwanese game publisher Gamania and Chinese publishers such as Shanda, 9 Cities, Tencent, and Giant to specialize in game publishing for Asia's niche markets. Nowadays, it earns most of its revenue from markets in Asia, in particular those of South Korea, China, Taiwan, and Japan. NCSoft has strengthened its footholds worldwide with the creation of its regional offices: NC US, NCSoft Europe, NC Japan, and NC Taiwan. However, the new release of the mobile game *Lineage M* (2017) has further boosted the company's global market performance.

NCSoft continues to emphasize technology innovation as its core investment strategy. To this end, in 2008, it established a research and development (R & D) center. The company emphasized building competitiveness to overcome the piracy that plagues Asia's regional markets of Asia. It remains committed to strengthening its intellectual property portfolio. By 2018, 69 percent of all NCSoft employees were working in its R & D division. The company is also exploring webtoon IP as it persists in enhancing cross-media user experiences based on the published games *AION* and *Blade & Soul*.

Peichi Chung

See also: Massively Multiplayer Online Role-Playing Games; South Korea

Further Reading

Je-yoon, Woo, and Minu Kim. "Virus to Aid NCSoft to Set New Earnings Milestone of 1 Trillion Won This Year." *Pulse News*, March 3, 2020. Available at https://pulsenews.co.kr/view.php?year = 2020&no = 222669.

NEC PC-Engine/TurboGrafx-16

The Japanese PC-Engine—and its American incarnation, the TurboGrafx-16—was designed by Hudson Soft engineers and produced by NEC in 1987. It was one of the first home consoles to be marketed as a 16-bit machine and has been associated with many other technological breakthroughs. Its lineup of shooting games and role-playing games (RPGs) managed to capture the Japanese market, but the console ultimately failed on the American front and was surpassed by the Nintendo Super Famicom in its homeland.

The Hudson company founders became interested in electronic entertainment in 1978 when one of their employees, Shinji Nakamoto, demonstrated software to his bosses. The Kudo brothers saw potential in this new market and started to produce games for personal computers. The response to the first Japanese-made entertainment software was overwhelming, and in 1979, the brothers decided to focus solely on this market and renamed the company Hudson Soft. A few years later, Hudson Soft had become one of the most prolific developers for the Nintendo Famicom, creating or adapting more than thirty-five titles, including *Lode Runner* (1984), *Star Soldier* (1986), and a game based on the popular manga/anime character *Doraemon* (1986). However, Hudson's engineers soon felt limited by the technological restrictions of the Famicom, and in 1985, they started to design a new machine. In 1987, Hudson brought a prototype to NEC, the largest manufacturer of Japanese personal computers at the time.

The PC-Engine's processor was based on the MOS 6502 architecture used in many personal computers and game consoles since its introduction in 1975. Thanks to an updated design and production process, the PC Engine version could operate at 7.16 MHz (the Ricoh variant used in the Famicom/NES, by contrast, ran at 1.79 MHz). In the United States, the console was marketed as a 16-bit contender on the basis of its graphical abilities: it featured 64 KB of video memory and a 9-bit color palette, but most significantly, it could display the majority of these 512 colors on-screen at the same time. The graphical architecture could also handle up to 64 sprites on-screen at once. On top of these cutting-edge specifications, NEC and Hudson decided to bring the notion of expandability in the console world to a new level. An extension bay was integrated in the core system; it was meant to receive many peripherals, most importantly the very first CD-ROM add-on ever released for a video game system, in 1988. The first HuCARDs or Turbochips cartridges typically held 250 KB of data; the format was further developed up to 2.5 MB (20 Mb) in the early 1990s. The main performance bottleneck of the system was the relatively low working memory (8 KB and 64 KB dedicated to the visuals); to handle data-intensive CD-ROM projects, NEC released multiple system cards (HuCARDs that increased the total amount of RAM available) throughout the life of the system.

Many variations of the system have been released in Japan and Europe, such as the CoreGrafx and the PC Engine Shuttle; except for the ill-fated SuperGrafx, these systems were essentially the same. The PC Engine Duo (1991) and Turbo Duo (1992) merged the core system, the CD-ROM, and the Super System Card in the same elegant console. NEC also released a portable version of its system, the PC Engine GT/TurboExpress (1990), which had the same specifications and could run all the HuCARDs on an impressive 2.6-inch color screen.

The launch of the PC-Engine in October 1987 was met with enthusiasm by the Japanese audience. NEC/Hudson released a few titles during the launch window, including the technically impressive *The Kung-Fu* (with sprites taking up half the height of the screen) and a port of the popular arcade game *Wonder Boy in Monster Land* (rethemed as *Bikkuriman World*). In 1988, NEC released a faithful conversion of Irem's *R-Type* on two HuCARDs. In 1989, *Gunhed* and *PC Genjin* hit the Japanese market; the cute prehistoric hero of the latter would soon become the console's mascot. Since Nintendo's attitude and restrictive licensing fees had generated some frustration among third-party publishers in previous years, NEC and Hudson managed to interest many smaller studios as well as established players. After a public feud between Nintendo and Namco, NEC was pleased to announce that the developer would bring to its console near perfect ports of its most popular arcade titles, such as *Galaga 88* (1987), *Dragon Spirit* (1987), and *Xevious* (1982). From October 1987 to January 1988, one million units had been sold.

NEC redesigned the exterior of the console and its marketing strategy for the North American region. Major gaming publications ran enthusiastic cover stories just before the expected fall 1989 launch. Despite some of the better games being adapted (*Blazing Lazers* [1989], *Legendary Axe* [1989], and *Bonk's Adventure* [1990]), the first year's sales did not meet expectations. Moreover, the expensive CD add-on ($499.99) along with its few early titles (including *Fighting Street* [1989] and *Ys Book I and II* [1990]) did not meet a large audience. NEC's console lacked franchises known to Americans; most of its prime titles were made to appeal to Japanese gamers and were not exported to the United States. As a result, SEGA quickly captured 90 percent of the 16-bit market in the United States.

From 1990 onward, many impressive ports of arcade shooting games were released in Japan both on HuCARD and CD format, including *Darius* (1990), *Aeroblasters* (1990), *After Burner II* (1990), *Gradius* (1991), *1943* (1991), and *Forgotten Worlds* (1992). *Gate of Thunder* (1992) and its sequel, *Winds of Thunder* (1993), have reached cult status among the genre's fans. Many mecha-inspired shooters were also released (such as *Maccross 2036* [1992] and *Spriggan* [1991]), and the late port of *Sapphire*, using the Arcade Card, was meant as a final technological tour de force in 1995. The console also had an extensive lineup of Japanese role-playing games; on top of popular HuCARDs such as *Dragon's Curse* (1990) and *Neutopia* (1989), many game series started to use the CD format more extensively to integrate animated cutscenes and digitized voices, such as the pioneer *Tengai Makyō* (*Far East of Eden*) (1989), the four *Ys* games, and many games associated with the *Dragon Slayer* franchise.

In Japan, popular manga and anime series, such as *Ranma 1/2*, *Sailor Moon*, and *Cobra*, were translated for the CD-ROM format into adventure games or digital comics/visual novels with minimal interactivity. Along with idol games (*No.Ri.Ko*, one of the first CD releases in 1988), approximately fifty titles that explore data-intensive designs at the expense of engaging ludic formulae have been released. NEC put a lot of effort into expanding the variety of genres available on its console: pinball simulators (*Devil's Crush* [1990]), strategy games (*Nectaris/Military Madness* [1989], and *Vasteel* [1990]), multiplayer party games (many iterations of *Bomberman*), and even simulation games adapted from personal computers (*SimEarth* [1993] and *Falcon* [1992]) were released.

To this day, the Super CD-ROM's *Castlevania* game (*Akumajō Dracula X. Chi No Rondo*; 1993) is considered one of the best in the series. The crowning achievement of the console—and a testament to the potential of its expandable architecture—came with the adaptation of SNK's *Fatal Fury 2* (1994) and *Art of Fighting* (1994) games on Arcade CD-ROM; these versions were closer to the arcade originals than the Super Nintendo and Genesis ports. In the United States, however, the TurboGrafx-16 was doomed by the lack of known franchises, the release of mediocre games and ports (such as *Yo Bro* [1991], *Impossamole* [1991], and *Nightmare Creatures* [1992]), and NEC's inadequate marketing.

Carl Therrien

See also: Generations of Technology

Further Reading

Harris, Steve. "Next Generation Gaming." *Electronic Gaming Monthly*, no. 2. Ziff Davis (1989): 33–43.

La Bible PC Engine. Cergy, France: Éditions Pix'N Love, 2009.

Pappas, Lee H. "It Was an Engine, but Now It's a Turbo." *Video Games & Computer Entertainment* (July 1989): 18–22.

PC Engine Catalog Project website. Accessed September 25, 2020. Available at http://www.pcecp.com.

PC Engine Software Bible website. Accessed September 25, 2020. Available at http://www.pcengine.co.uk.

Therrien, Carl. *The Media Snatcher: PC/CORE/TURBO/ENGINE/GRAFX/16/CDROM2/SUPER/DUO/ARCADE/RX*. Cambridge, MA: MIT Press, 2019.

Neo•Geo

The Neo•Geo was an arcade system and home video game system released in 1990 by the Japanese game company SNK (Shin Nihon Kikaku). It was available in two versions, as the arcade-oriented MVS Multi Video System (MVS) and the Advanced Entertainment System (AES) home console. Both variants were built around a 16-bit Motorola 68000 processor, operating at 12 MHz, and an 8-bit Zilog Z80 coprocessor, running at 4 MHz. The Neo•Geo's custom video chipset was capable of simultaneously displaying up to 380 hardware-scalable sprites in 4,096 colors (from a 65,536 color palette) at a resolution of 320-by-224 pixels. A dedicated Yamaha sound chip provided fifteen high-quality sound channels. In both its arcade and home incarnations, the system used high-capacity cartridges. Although the original specifications capped the ROM size at 330 megabits, a number of second- and third-generation titles employed bank-switching technology to bypass this limit.

The Neo•Geo systems are notable for a number of technological innovations. Similar to the DECO Cassette System and the Nintendo PlayChoice-10, the MVS's modular design allowed arcade operators to change games quickly and easily, and at under $500 per new release cartridge, it offered a considerably cheaper alternative to $1,000-plus dedicated circuit boards. In addition, available in one-, two-, four-, and six-slot versions, the MVS motherboards accommodated up to six individual titles within a single cabinet for significant space savings.

Based on a modified single-slot MVS board (with unique cartridge pinout to prevent the use of the cheaper home cartridges in arcade machines), the AES was the first system to offer direct equivalents of popular arcade titles for at-home play. A two-dimensional powerhouse, it easily eclipsed the 16-bit home consoles of the time. It was also the first system to use memory cards. Interestingly, because the memory cards were also compatible with the MVS cabinets, it was possible to transfer game saves and high scores between home versions and arcade versions of the same title.

The AES was initially conceived as a rental system because of its high price. At launch, a bundle consisting of the console, two controllers, a memory card, and one game retailed for $649. In an attempt to reduce manufacturing costs and cut down the retail price, in 1994, SNK introduced a CD-based version of the system, dubbed Neo•Geo CD, followed in 1996 by the revised Neo•Geo CDZ. The games were identical to cartridge-based equivalents but suffered from long loading times (both versions used a single-speed CD-ROM drive).

The Neo•Geo's intended successor, the Hyper Neo•Geo 64—a 64-bit arcade platform with three-dimensional graphics capabilities—was a commercial failure. Introduced in 1997, the system was not backward compatible and only received seven games before it was discontinued in 1999. SNK's two attempts to venture into the handheld market, the Neo•Geo Pocket (1998) and Neo•Geo Pocket Color (1999), were also unsuccessful.

Notable Neo•Geo titles include the fighting game series *Fatal Fury* (1991–99), *Art of Fighting* (1992–96), *Samurai Showdown* (1993–2004), and *King of Fighters* (1994–2003) and the run-and-gun series *Metal Slug* (1996–2003). The system also received a number of high-quality scrolling shooting games, including *Last Resort* (1992), *Pulstar* (1995), and *Blazing Star* (1998). The last Neo•Geo game, *Samurai Showdown V Special*, was released in 2004, marking the end of the system's fourteen-year life span.

P. Konrad Budziszewski

See also: Arcade Games; Generations of Technology

Further Reading

Bevan, Mike. "Arcade Inspection: Neo-Geo MVS." *Retro Gamer* 54 (2008): 76–81.

"Neo-Geo Arcade Entertainment System." *Games* (May 6, 2003): 142–145.

Neo-Geo.com website. Accessed September 25, 2020. Available at http://www.neo-geo.com.

"SNK (1978–2001)." *Games* (May 6, 2003): 140–141.

NES. *See* Nintendo Entertainment System/Nintendo Famicom

NetEase

NetEase, Inc., is an internet technology company. Its portal NetEase, or 163.com, provides diverse services, from news, e-mail services, financial services, educational videos, eLearning (called Netease Open Course), and online shopping (with its subportal *Kaola*) to content such as livestreaming, entertainment, sports, fashion, tourism, and so forth. The most notable business of NetEase, Inc., is its game business and its most popular massively multiplayer online role-playing games (MMORPGs) *Fantasy Westward Journey* (2001; *Menghuanxiyou* in Chinese) and *Westward Journey Online II* (2002; *Dahuaxiyou Online II*). Many of NetEase's popular games developed from Chinese historical epics and classic novels, such as *Journey to the West* (1592). With such traditional themes echoed by players, it is not difficult to imagine nationalism and patriotism infiltrating gaming and game culture.

In 2006, in response to a founder of the game guild named "Kill the little Japs," administrators of *Fantasy Westward Journey* (2001) expunged the seven hundred–member anti-Japanese guild and locked the account of its founder. Subsequently, players continued to self-organize massive anti-Japanese protests online in various blogs and game spaces (Lemon 2006; Kshetri 2009). Political sensitivity did put the game company at risk, and so did social controversy. Although the exact details cannot be traced—as all online reports were removed—the Chinese state also banned *Westward Journey Online II* (2002) for several months because the content of the game allegedly had themes of obscenity and antisocial norms, such as in-game marriage (Wu et al. 2007). As of 2017, *Fantasy Westward Journey* had attracted more than 100 million global downloads and a record of 2.7 million concurrent user count in 2017 (Cowley 2017).

Besides developing its own games, NetEase gained its fame by publishing local versions of licensed games, such as *World of Warcraft* (original, 2004; NetEase version, 2009), *Diablo III: Reaper of Souls* (2014), and *Minecraft* (original, 2009; NetEase version, 2016) to name a few. As of 2016, NetEase was ranked as the seventh public game companies in terms of game revenues, just after EA (with an annual revenue of $4.28 billion) (Takahashi 2017). However, today, the company Tencent—able to draw gamers directly from its social media, *WeChat* and *QQ*—has surpassed NetEase's position in terms of game revenues. Netease is now diversifying its digital business into other areas, such as music streaming, online learning, and e-commerce.

Anthony Y. H. Fung

See also: China

Further Reading

Cowley, R. "Fantasy Westward Journey Players Exchange over $7.3 Million Worth of In-Game Currency Daily." Pocketgamer.biz, March 28, 2017. Available at https://www.pocketgamer.biz/asia/news/65399/netease-fantasy-westward-journey-in-2017/.

Kshetri, N. "The Evolution of the Chinese Online Game Industry." *Journal of Technology Management in China* 4, no. 2 (2009): 158–179.

Lemon, S. "WORLDBEAT—Chinese Take Anti-Japan Protest Online." Network

World, July 11, 2006. Available at https://www.networkworld.com/article/2304732/software/worldbeat---chinese-take-anti-japan-protest-online.html.

Takahashi, D. "Tencent Leads the Top 25 Public Game Companies with $10.2 Billion in Revenues." VentureBeat, March 23, 2017. Available at https://venturebeat.com/2017/03/23/tencent-leads-the-top-25-public-game-companies-with-10-2-billion-in-revenues/.

Wu, W., S. Fore, X. Wang, and S. Ho. "Beyond Virtual Carnival and Masquerade: In-Game Marriage on the Chinese Internet." *Games and Culture* 2, no. 1 (2007): 59–89.

Netherlands, The

In 2016, an article in a major Dutch newspaper caused ripples throughout the Dutch game industry and gaming-related universities. The article paints a picture of the game industry's overstated growth potential and warnings about false promises. It suggests that far too many universities were drawing in large numbers of students who, after college, would meet an industry with too few job opportunities. The industry was swift to respond by explaining that many students, in fact, do find work, but not always directly in the entertainment gaming industry. Instead, they wind up in the applied gaming sector and related fields of multimedia design, software development, and other areas within the larger Dutch media and technology landscape.

As Nieborg and De Kloet point out, the Dutch gaming sector, like many other European gaming sectors, is oftentimes framed within a master narrative of potential. And with success stories such as triple-A developer Guerilla Games (the *Killzone* series, *Horizon Zero Dawn* [2017]) and indie developers such as Vlambeer (*Super Crate Box* [2010], *Nuclear Throne* [2015]), the attractiveness of the Dutch gaming sector is clear. However, such narratives function as a technological imaginary growing a speculative bubble that, in turn, draws in investors and state subsidies and helps to establish more game programs within Dutch Universities. While this speculation may indeed surpass the revenue potential of the industry, the industry's response to the 2016 news article claims that this depends on one's definition of the scope of the Dutch game industry as one primarily dedicated to entertainment or one that can be expanded far beyond. Here, we argue for the latter, showing that entertainment and more applied purposes of game design are both key in understanding the Dutch gaming industry.

The history of the game industry in the Netherlands starts early on with the acquisition of U.S.-based Magnavox, creator of the first game console, the Odyssey, by Dutch electronics company Philips in 1974. In the years after, Philips would release a string of early home consoles under both Magnavox's Odyssey banner as well as its own Telespel and Videopac brands. As Lenting notes, Philips seemed to put a clear mark on the focus and scope of the Dutch game industry by framing its products as home computers rather than gaming consoles. First, this means that a machine like the Philips P2000 was never meant exclusively for entertainment gaming but also for education and business purposes, thereby inadvertently adding nonentertainment software to the scope of the Dutch game industry. In fact, Philips's hardware also came with cartridges with software meant to introduce consumers to simple forms of computer programming. Second, by framing their hardware as home computers, Philips put the focus of the Dutch industry squarely on PC games. This was further emphasized by a lack of big console publishers and a vibrant bedroom coder scene. The Netherlands, like many European countries, therefore also never fully entered the console and arcade industries dominated by the United States and Japan, which also means the game industry crash of the 1980s left the Netherlands relatively unscathed.

Although games for Philips's hardware were never produced in the Netherlands, software and game development in the Netherlands did start soon after the release of the Commodore PET in 1977. This early development took place among hobbyists experimenting with this early home computer. In the early 1980s, the activities of these bedroom coders would result in the first generation of game developers such as Radarsoft en Aackosoft publishing games for the Commodore 64 and MSX computers from the mid-1980s onward. Their games were a combination of original work and clones of existing games and again offered both pure entertainment genres as well as educational titles.

In the 1990s, this dual approach to both entertainment and education remained. After a failed effort to work together with Nintendo to develop its first CD-ROM-based console, Philips wound up releasing its own disc-based CD-i console in 1991. Its high price tag and confusing, unfocused marketing (one machine for games, films, music, and education) resulted in a costly flop for the company. The CD-i is now mostly remembered as one of the only non-Nintendo platforms to see the release of several (abysmal) *Zelda*-based games—a leftover from the original Nintendo collaboration. Another Dutch company did succeed in combining entertainment and applied games: software developer Davilex had a string of successes, such as the distinctly Dutch *A2 Racer* (1997) and educational *RedCat* series, both of which remain among the most well-known national games among older Dutch gamers.

The 2000s saw the start of the first game-focused programs at Dutch universities of applied science. As Nieborg and De Kloet point out, releases on the PlayStation by developers such as Guerilla Games, and the activities of the then new (but now defunct) Dutch publisher Playlogic made setting up a games curriculum viable and attractive. Furthermore, students from the first few cohorts became founders of several still existing and successful game companies, such as Vlambeer, Ronimo, and Monobanda. This flurry of activity was further supported by a large amount of public funding by the Dutch government, which, spread over various subsidy programs, spent many millions of euros. The focus of these subsidies, however, was mainly aimed at applied gaming, a sector that has always existed in parallel and often close cooperation with the entertainment branch of the industry.

The decade of the 2010s reaffirms this dual nature of the Dutch game industry. The self-published *Games Monitor 2015*, which show the developments and trends in the industry of that year, revealed there were as many developers making entertainment games as there were making applied games. However, the most recent *Games Monitor* (2018) also specifically emphasizes a growing entertainment sector, with the number of companies now surpassing those focused on applied games. This trend is mostly composed of gaming graduates starting their own small companies seeing new possibilities for self-publishing their games on new distribution platforms, such as Steam, Android, and iOS, and exploring new revenue models, such as in-app purchases and advertising, crowdfunding, or patronage. While this initially sounds like the industry is finally living up to its (at times) strategically exaggerated potential, new digital platforms, such as those found on smartphones, with their own particular hit-driven markets, are increasingly difficult to break into for newcomers. As such, many new, smaller companies do not have long life spans. The rise in attention to the business of developing and marketing games in design schools and within successful incubator organizations, such as the Dutch Game Garden, does present a more solid jumping-off point for those entering the industry both in entertainment and applied gaming sectors.

As was also argued in the 2016 newspaper article, the Netherlands as a country is too small to sustain a market in which all gaming graduates wind up working on entertainment. However, from its beginning, the Dutch industry has always sought to diversify into applied markets, which has thoroughly shaped this dual focus of the Dutch game industry, creating an industry where entertainment games stand on equal footing with applied games. More so, students with a game design background are now found in every sector of the media and technology industry, showing that an industry's perceived but also *actual* potential does not just lie in its most visible and recognizable product, the game.

René Glas and Jasper van Vught

See also: Serious Games

Further Reading

Donovan, Tristan. *Replay: The History of Video Games*. Lewes, England: Yellow Ant, 2010.

Lenting, Tom. *Gamegeschiedenis van Nederland 1979–2018*. Arnhem, Netherlands: Karel van Mander Academy—Reeks voor Visueel Erfgoed, 2019.

Nieborg, D. B., and J. de Kloet. "A Patchwork of Potential: A Survey of the European Game Industry." In *Global Game Industries and Cultural Policy*, edited by Anthony Fung, 201–226. Cham, Germany: Palgrave Global Media Policy and Business, 2016.

Networked Games. *See* Online Games

New Zealand

New Zealand had a quite isolated and remarkably active early microcomputer, console and, arcade game scene in the late 1970s and early to mid-1980s, before the wave of global commercial hardware and game titles rolled in. Although it is difficult to determine the dates of release of many computer systems and consoles in New Zealand, they usually lagged behind the rest of the world by a year or more (Swalwell 2005, 1). For instance, the IBM PC (or clones) were not yet available in 1982 and only became "a commodity" in 1986 (Doran and Trotman n.d.); the Sinclair ZX81, released in the United Kingdom in 1981, was still selling for NZD 199 in 1983 and for half that price in 1984 (Swalwell 2007, 270); and the Atari VCS 2600, released in the United States in 1977, was presumably still sold in New Zealand (at a low price) in the mid-1980s (Swalwell and Loyer 2006). The reasons for New Zealand's relative isolation might be found in the long distance from the rest of the world and the associated transport costs and import restrictions (finally lifted after 1984), together with tax incentives that invited local production (Kraemer and Dedrick 1993, 20; Swalwell 2005).

The majority of popular computer systems were eventually released in New Zealand. Initially, as in the rest of the world, due to high prices, computers were predominantly owned by companies and government institutions, not by individuals. Schools and high schools used a wide variety of systems, for example, the Macintosh Plus, different versions of the Apple II, and the Acorn BBC Micro, but also the basic Sinclair ZX81. In 1982, the Apple II was offered at a discounted price of NZD 1,200 to schools ("normal school price" NZD 4,812; *Bits & Bytes*, 1982, 12), and the BBC Micro advertised for NZD 1,595, with "education prices available" (5). The Australian retail chain Dick Smith sold a number of computers that were copies of other systems, the most notable being the System-80, a TRS-80 clone that retailed for NZD 1,200 in 1980 (Stewart n.d.) and for NZD 1,295 in 1982 (this price and the following prices, *Bits & Bytes* 1982, 35). Other popular home computers included the Atari 400 (NZD 1,295), 800 (NZD 2,695), and XE; the Commodore Vic 20 (NZD 899) and its successor, the C64; the Sinclair ZX81 (NZD 199); and the ZX Spectrum. Of these, the Commodore 64 was the most advanced and proved popular. The Acorn BBC and the Electron, which was a downgraded version of it, might be best known for *Elite* (1984) and *The Sentinel* (1986; released as *The Sentry* in the United States), which were originally written for them. New Zealand was one of the few places outside Japan where the SEGA SC-3000 (a SG-1000 console with an integrated keyboard) had a "wide and loyal following" (Swalwell 2005, 5). Collectors Wheeler and Davidson "have assembled a list of locally published software . . . [with] some 300 titles of tape software, not counting cartridges, disks, or typed-in programs" (Swalwell 2009, 268). The Amstrad CPC competed against the Commodore 64, and the Atari ST against the Commodore Amiga. Beginning in the early 1980s, the Polycorp New Zealand Ltd. developed and marketed the Poly (in three versions, 1, 2, and C), a computer aimed at educational settings (*Bits & Bytes* 1982, 11). It featured an 8-bit Motorola 6809 processor, 64K RAM, color screen, and network capability (14). Peripherals included a 600K disk drive, a cassette recorder, and a printer. It was locally manufactured with 70 percent New Zealand parts, including the circuit boards (13). Various programming languages (e.g., BASIC, Pascal, Logo), games, and educational software (Doran and Trotman n.d.) aligned with local school curricula were available. Discounted school prices went from NZD 4,110 for a nonnetworked single-user system with cassette recorder interface to NZD 8,090 for a networked unit with a disk drive (*Bits & Bytes* 1982, 14).

Not all consoles popular in Asia, the United States, or Europe made it to New Zealand. Consoles apparently not available were Coleco's ColecoVision, the Mattel

Intellivision, and the GCE/Milton Bradley Vectrex (Davidson n.d.). The Atari 2600 was still being sold in 1983 (Swalwell and Wilson 2004), although "only a few" game cartridges were officially released and "hardly any third-party titles" were available (Davidson n.d.). Its most popular clone was the Kingsway system with sixty-four built-in games (Davidson n.d.). Other available consoles were the Atari 7800, SEGA's SG-1000, the SEGA Master System, the SEGA Mega Drive, Nintendo's Game & Watch, the Nintendo Entertainment System (NES), and the Super Nintendo Entertainment System (SNES). Several consoles appear to have been made in New Zealand: the Sportronic (late 1970s and early 1980s, a *PONG* [1972] clone build by Osborne Professional Electronics for Sportronic TV, a division of the Spectrum Group of Auckland; Brown 2003); the Tunix Home Arcade (possibly identical to the system known as the Leisure Vision; Swalwell 2005, 5); the Fountain Video Game and Force II Video System (both licensed versions of the 1976 Radofin 1292 Advanced Programmable Video System); the Videosport made by C.V.T. Industries of Auckland (see Swalwell 2006); and Grandstand's Database and Mark III Video Game (sold in the United Kingdom as Programmable Game; for both consoles, eight game cartridges are known to exist; Davidson n.d.). Both the Tunix as well as the Database may appear to be clones of the Emerson Arcadia 2001 console, but they merely shared the same (possibly licensed) core (Davidson n.d.; Swalwell 2005, 5). Grandstand also rebranded and sold Orbit Electronics' UVI Compu-Game as Video Master (also an Arcadia clone; Davidson n.d.). A console by David Reid Electronics may "have [only] sold in very small numbers" (Swalwell and Davidson 2016, 1).

The arcade business was considerable in New Zealand, given the relatively small size of its population. As many as a dozen companies may have been involved as manufacturers, importers, distributors, and game producers, and there were local offices of larger companies (Swalwell 2005, 3; Swalwell 2006, 14; Swalwell and Davidson 2016, 88). A popular practice was to only import the game boards but build the cabinets locally to save on shipping costs and to take advantage of concessions for goods that were (partly) manufactured in the country (Swalwell and Davidson 2016, 3).

Kitronix (Kitset Electronics Limited) of Auckland, founded by Ralph Stevenson, was a game producer whose games included *GP Racer* (1974?), *Galactic Invaders* (1980), *Malzak* (1980; about five hundred machines sold), *Malzak II* (probably released shortly after *Malzak* as a slightly different version of the game), and *Panix* (unknown year), possibly inspired by the arcade game *Space Panic* (1980) by route of the Apple II game *Apple Panic* (1981) (Swalwell and Davidson 2016, 96). Kitronix made its own metal eight-way joysticks and metal buttons (92) and also exported arcade machines to Australia (Swalwell 2005, 5).

A number of companies were operating out of Christchurch, including George Rait's Rait Arcade Games, Taito-tronics, Chris Looman's Advance Automatics, and Chris Chaston's Chastronics. Rait Arcade Games produced games in the early 1980s (such as *Azurian Attack* [1982]); Taito-tronics was a local agent of Taito Japan, and Advance Automatics was an agent for Atari, Stern, Williams, and Gottlieb (Swalwell 2005; Swalwell and Davidson 2010). Chastronics was one of the largest suppliers of arcade games in New Zealand in the early 1980s, although "most of the [game] boards appear to be bootleg versions" (Davidson n.d.).

Other companies focused on distributing computers and consoles and coding and selling software for them. Among them were Scorpion Software/Flexisoft, Poseidon of Tokoroa, and Softtime. Les Kenyon's Grandstand of Auckland worked "in partnership with R. R. Fenton (later Mattel)," importing handheld/tabletop consoles "from Japan and Hong Kong" and building cases and assembled devices locally (Swalwell 2005, 5); they were also a distributor for the SEGA SG-1000 and SC-3000 systems until 1986, when the company focused on Amstrad instead (Davidson n.d.). Auckland's Monaco Distributors sold the Atari 2600 console and cartridges and the Tunix console. The Australian-based company Home Entertainment Suppliers also distributed Atari cartridges in New Zealand (Davidson n.d.). In the 1980s, arcade machines were not only found in amusement arcades but also virtually every takeaway bar. These machines were popularly called *Spacies* (from *Space Invaders* [1978]), and children spent hours hanging out at the local takeaway shop playing *Spacies*.

The overwhelming majority of magazines in New Zealand were (and still are) imported from the United Kingdom. There were, however, some local publications featuring home computers and consoles. The Christchurch-based magazine *Bits & Bytes*, which published its initial issue in September 1982, was the first magazine to focus on the developing microcomputer scene (Stewart n.d.). NOMAC published *Computer Input* magazine beginning in October 1983 and *SEGA Computer—The Official Magazine of the SEGA User Club of New Zealand* in July 1984. *SEGA Computer* was set up by Grandstand and centered around (game) programming (most of it in BASIC but some in machine code as well as hints, program listings, and program dissections), background information (e.g., on scrolling, optimized RAM usage, random numbers, hidden commands, error messages), and even some hardware hacks (such as a household burglar alarm).

Given the initial and sometimes continued limited availability of software, many early computer games were created by amateur enthusiasts, given away, and copied freely, especially for computer systems used in schools. The September 1982 issue of the Christchurch-based magazine *Bits & Bytes* presents ten user clubs for various systems (35ff.), focused on, for instance, users helping each other, creating and sharing software, and publishing newsletters. Computer systems such as "the Commodore, Amiga, and TRS-80 systems" sparked "high levels of hobbyist activity" (Swalwell 2009, 273). Over two hundred "locally developed game titles" for microcomputers written in the 1980s in New Zealand have been documented so far (Swalwell and de Vries 2013). The user-created games only had limited distribution, and many titles are now considered lost. Games were also typed in from program listings published in magazines, a common practice at the time, even in other countries. In the late 1980s, cassettes were replaced with disks for data storage. Because commercial games were copied and swapped, they began to feature copy protection, which was subsequently removed by cracking crews, who branded the games with intros, which happened in New Zealand as in other places.

The evidence of early computer games popular in New Zealand appears sketchy today. The main problems that hamper attempts to access, preserve, and distribute games are "outdated hardware, deteriorating software, and intellectual property restrictions" (Swalwell 2009, 265). Early digital artifacts, such as games, were only created relatively recently in the 1970s and 1980s and are still covered by copyright. The biggest challenge for preservation efforts apart from "finding the people who wrote or published titles [and] gaining their support . . . is determining whether they still legally own copyright" (269). This situation leaves many titles in limbo (Swalwell 2009) as orphan works or abandonware that either cannot can be legally used or disseminated or only with limitations. The issue is specifically pressing in regard to media whose "physical platforms are likely to decay well before their copyright protection expires" (Corbett 2010, 184).

For a country such as New Zealand, the issues of orphan works and abandonware impact work on cultural heritage more immediately and significantly than they impact the economy (Corbett 2010, 196; Swalwell and de Vries 2013). In 2004, the New Zealand government issued its Digital Content Strategy, "which contained provision for a National Digital Heritage Archive (NDHA), to be set up by the National Library of New Zealand" (Swalwell 2009, 267), and Digital Strategy 2.0 was launched in 2008. Although the singularity of many game titles is increasingly realized, the collecting and archiving is left to private persons and initiatives (Swalwell 2009). Attempts to officially preserve software, such as legislative support, is lacking; many issues still need to be addressed (Corbett 2010, 193ff.). Current provisions for preservation efforts by national and international copyright agreements, such as the Berne Convention, may well be "inadequate" (181) or insufficient, and agreements such as the Vancouver Declaration still lack implementation (Swalwell and de Vries 2013).

Daniel Cermak-Sassenrath

See also: Australia; Preservation

Further Reading

Auckland Reporter. "An Apple for the Teacher…." *Bits & Bytes*, September 1982: 12. Available at https://www.classic-computers.org.nz/bits-and-bytes/downloads/NZ-bits&bytes-issue-1.pdf.

Brown, Russell. *Blast from Our Past*. October 24, 2003. Available at http://unlimited.co.nz/unlimited.nsf/opinion/blast-from-our-past (site discontinued).

Corbett, Susan. "Regulation for Cultural Heritage Orphans—Time Does Matter." *WIPO Journal: Analysis and Debate of Intellectual Property Issues* 1, no. 2 (2010): 180–196. Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1680044.

Davidson, Michael. *Obscure Pixels: Retrogaming with a New Zealand Slant*. Available at http://homepages.ihug.co.nz/~pinwhiz (site discontinued).

Doran, Bob, and Andrew Trotman. "Preserving our Heritage NZ-made Computers." Accessed September 25, 2020. Available at http://www.cs.otago.ac.nz/homepages/andrew/papers/2010-5.pdf.

Kraemer, Kenneth L., and Jason Dedrick. "Turning Loose the Invisible Hand: New Zealand's Information Technology Policy." UC Irvine: Center for Research on Information Technology and Organizations. 1993. Available at http://escholarship.org/uc/item/6tx9v7g5.

Marshall, Donovan. *State of the Ark, Donovan Marshall's Computer Collection*. Accessed September 25, 2020. Available at http://www.stateoftheark.co.nz.

Play It Again. "Grandstand." Accessed September 25, 2020. Available at www.ourdigitalheritage.org/archive/playitagain/companies/grandstand.

Stewart, Terry. *Classic Computers (One New Zealander's View)*. Available at https://www.classic-computers.org.nz/.

Swalwell, Melanie. "Early Games Production in New Zealand." *Proceedings of DiGRA 2005 Conference: Changing Views—Worlds in Play*. 2005. Available at http://www.digra.org/dl/db/06278.19100.pdf.

Swalwell, Melanie. "New Zealand." In *Video around the World,* edited by Mark J. P. Wolf, 377–392. Cambridge, MA: MIT Press, 2015.

Swalwell, Melanie. "NZ's Videogaming Past and the Questions of Its Future." *Script #64, National Association of Media Educators*, April/May 2006: 14–16.

Swalwell, Melanie. "The Remembering and the Forgetting of Early Digital Games: From Novelty to Detritus and Back Again." *Journal of Visual Culture* 6, no. 2 (2007): 255–273. Available at http://vcu.sagepub.com/content/6/2/255.

Swalwell, Melanie. "Towards the Preservation of Local Computer Game Software: Challenges, Strategies, Reflections." *Convergence: The International Journal of Research into New Media Technologies* 15, no. 3 (2009): 263–279. Available at http://con.sagepub.com/content/15/3/263.

Swalwell, Melanie, and Michael Davidson. "Game History and the Case of 'Malzak': Theorizing the Manufacture of 'Local Product' in 1980s New Zealand." In *Locating Emerging Media*, edited by Germaine R. Halegoua and Ben Aslinger, 85–105. New York: Routledge, 2016. Available http://www.academia.edu/738239/Game_History_and_the_Case_of_Malzak_Theorising_the_manufacture_of_local_product_in_1

Swalwell, Melanie, and Michael Davidson. "Malzak." 2010. Available at https://web.archive.org/web/20100525131538/http://nztronix.org.nz/publications.php.

Swalwell, Melanie, and Denise de Vries. "Collecting and Conserving Code: Challenges and Strategies." *Journal of Media Arts Culture* 10, no. 2 (2013). Available http://scan.net.au/scn/journal/vol10number2/Melanie-Swalwell.html.

Swalwell, Melanie, and Erik Loyer. "Cast-Offs from the Golden Age." *Vectors Journal of Culture and Technology in a Dynamic Vernacular* 2, no. 1 (Fall 2006). Available at http://vectors.usc.edu/projects/index.php?project=66.

Swalwell, Melanie, and Jason Wilson. "International–NZ Game History Timeline." 2004. Available at https://web.archive.org/web/20100525131538/http://nztronix.org.nz/publications.php.

Newsgames

The term *newsgames* was originally coined by media scholar and game designer Gonzalo Frasca to describe interactive computer simulations of political cartoons known as *editorial newsgames*. They now include infographics, documentary, literacy, and community video games that function as journalism. Unlike the fantasy content of traditional video games, newsgame content focuses on reality, and gameplay functions as a tool for understanding the world.

Newsgames operate at the intersection of video games and journalism. Designed in response to actual events, they often deal with larger social, political, and economic issues. *Spent* (2011), for example, places the user in a scenario in which he or she has just lost his or her job and must make $1,000 last for one month. A financial challenge is also central to *Rebuilding Haiti* (2014), which demonstrates the difficulty of financial planning faced by Haiti in the wake of its major earthquake. Newsgames are persuasive in nature and seek a wide audience in service to the public interest. Most are therefore available online and are played through a web browser. The internet, rather than console gaming, and digital journalism are direct extensions of newsgames.

As a supplement to traditional news, newsgames offer the context and analysis of journalistic documentaries. Newsgames typically draw from the methods of print features or documentary video journalism to probe beneath headlines. The social, cultural, and economic dimensions of life in gangs in inner-city Chicago is emphasized in the adventure game *We Are Chicago* (2017). This narrative-based game borrows from Rockstar Games' visual aesthetic and gameplay for a blend of activism, advocacy journalism, and documentary filmmaking drawn from the real stories of inhabitants of a South Side neighborhood. The game's immersive experience encourages empathy for those negotiating school, gang, and family life in a city plagued by unprecedented murder rates.

Newsgames often have a persuasive intent. The intimacy of the gaming experience through an avatar based on a real, rather than fictional, subject carries social and psychological implications, especially through the heightened sense of empathy that can be a catalyst for political change. Games designed to elicit heightened empathy treating the immigration crisis include *Against All Odds* (2007), *The Refugee Challenge* (2014), and *The Migrant Trail* (2014). The open-world game on the Iranian Revolution, *1979 Revolution: Black Friday* (2016), by iNK Stories, immerses players in the context of war. But instead of adopting the perspective of a combatant as in traditional first-person shooters such as *Call of Duty* (2003), the user is tasked with covering the event as a photojournalist. This use of gameplay to expose the process of journalistic production is also evident in *Al Jazeera*'s game *Pirate Fishing* (2014), which places users in the role of a reporter to experience the ethical challenges and risks inherent in policing illegal trafficking by sea.

The use of gameplay mechanics and logic to convey information and present a point of view provides a valuable interactive supplement to traditional news. Given the highly immersive and empathic potential of newsgames, their producers bear greater responsibility than their fictional counterparts for the transparent communication of their intentions and biases. Newsgames overlap with advergames, such as the quiz appended to *Cocainenomics* (2015) the sponsored content digital long-form feature on the Pablo Escobar drug trade created by WSJ Studios to promote the Netflix series *Narcos* (2015). The ethics of newsgames has been called into question by critics who allege that the gamification of news trivializes serious issues. However, since 2003, innovations in the genre have demonstrated how video games can perform as effective journalism. Among the many quizzes and games that have augmented digital journalism are the German website *Opinary*, *You Draw it* (2017) from the *New*

York Times, and *Einheitreise* (2017) from the *Berliner Morgenpost*. *Propublica* used its renowned investigative storytelling and data journalism for the production of *HeartSaver: An Experimental Game* (2013).

The use of quizzes and interactives to attract an online news audience began with *BuzzFeed* in 2008. Despite the platform's focus on lists as the main mechanism for expanding its audience, *BuzzFeed* maintained its use of quizzes to draw additional traffic. The strategy paid dividends, as the market for gamified journalism and newsgames soared within the next six years. *Slate*'s game *Name Generator* (2014) became the most popular interactive feature in its history, and the *New York Times*' dialogue quiz was its third most popular piece that year (Lichterman 2015).

GAMES AS JOURNALISM

Gaming formats enhance the core democratizing function of journalism to expose policy, power, ideology, and self-interest that is otherwise less apparent in traditional news stories. *Half the Sky Movement: The Game* (2013), based on the nonfiction book and PBS television series *Half the Sky: Turning Oppression of Women into Opportunity Worldwide* (2012), represents gamified journalism that directly advocates for oppressed populations in more empathetic and powerfully intimate ways than stereotypical "soft news" associated with escapist entertainment media. The activist mission of the organization Games for Change represents the new wave of advocacy newsgames, including those on behalf of the disabled in *Beyond Eyes* (2015), members of the LGBTQ community in *A Closed World* (2011), and children of nations at war in *Lila and the Shadows of War* (2016).

Open-world games, like many newsgames, thrive on "procedural rhetoric" that simulates how things work through models (or systems) that users can interact with. Narrative remains essential to that procedural rhetoric because stories experienced through games, as with stories told through traditional narrative media forms, communicate relational and emotional information. Narrative journalism is enhanced by gaming according to the principle that the human mind is not inclined to function like a fact-memorization machine but instead operates according to affective association that draws on empathy. Gaming is particularly adept at eliciting empathy by placing the user in the place of others for a simulated experience of their emotions to build emotional memory. Newsgames are effective at conveying narrative because stories establish frameworks inside of which the players' objectives become significant and meaningful from a human perspective.

David O. Dowling

See also: Advergames; Procedural Rhetoric

Further Reading

Bogost, Ian, Simon Ferrari, and Bobby Schweizer. *Newsgames: Journalism at Play*. Cambridge, MA: MIT Press, 2010.

Lichterman, Joseph. “Riddle Me This: How Can News Orgs Better Use Games and Quizzes?” NiemanLab, February 18, 2015. Available at https://www.niemanlab.org/2015/02/riddle-me-this-how-can-news-orgs-better-use-games-and-quizzes/.

Plewe, Christoph, and Elfriede Fursisch. “Are Newsgames Better Journalism?” *Journalism Studies* 19, no. 16 (2018): 2470–2487.

Night Journey, The

Bill Viola and USC Game Innovation Lab’s *The Night Journey* (2007, 2018) was an early experimental art game developed as a collaboration between the media artist Bill Viola and the USC Game Innovation Lab, specifically game designer Tracy Fullerton and developer Todd Furmanski, art director Kurosh ValaNejad, and audio designer Michael Sweet. The game development was supported by grants from the NEA media arts program and the Annenberg Institute at USC after an initial concept phase sponsored by Intel.

The goal of the game design was to meld the media of video art and games to create an experience that evoked the spiritual journey, a theme that is found throughout Viola’s prior work. To do this, the team worked with an archive of Viola’s videos, using them as inspiration for the design of the explorable 3-D world as well as media for the in-game “reflections” and “dreams.”

The game mechanics are based on the idea that the archetypal spiritual path always involves a kind of reflection that reveals mysteries beyond the surface of one’s experience in the world. In the game, the reflection mechanic does just this, merging Viola’s eerie videos with a heavily postprocessed black-and-white game environment, creating an effect of visions arising from the landscape. These visions, or reflections, as they are called in the game literature, hearken to a set of themes in each of the main areas of the landscape. The desert area reflections are visions of the spirit emerging. The underwater area reflections depict the submerging of the body in a kind of baptism. The mountain area reflections are a retreat into the self, the heart, and darkness. The forest area reflections depict the encounter with the Other, in the form of animal spirits. These reflections are echoed again in dreams that the player has at the end of each night cycle of the game.

The game takes place over the course of six cycles, which equate loosely to the six bardo states of Tibetan Buddhism. In each of these cycles, the player is dropped into a new place in the world to begin that day’s journey. Along the way, the player may find special locations that transition the game into a very different internal world. He or she may also encounter ghostly inhabitants of the world. It is unclear whether the world the player journeys in is the “real” one or the imagined one, and it is unclear whether the images that are seen at the end of each day are dreams or memories. The abstract nature of the gameplay is intended to invite introspection about the imagery and the nature of the spiritual journey.

The Night Journey premiered in its exhibition format at the SIGGRAPH art gallery in 2007. It was subsequently shown in this format at a number of galleries and festivals around the world for the next decade, including the Museum of the Moving Image in Queens, New York; the Nam June Paik Art Center in Seoul, Korea; the ZKM | Center for Art and Media in Karlsruhe, Germany; and the Museum of Design in Atlanta, Georgia. It was awarded Most Sublime Game at IndieCade 2008. In June 2018, a home version of the game launched for PlayStation 4, Windows PC, and Macintosh.

Tracy Fullerton

See also: Contemplative Games

Further Reading

Fullerton, Tracy. "Reflections on the Night Journey: An Experimental Video Game." *Kritische Berichte*: "The Ludic Society—The Relevance of Videogames 2" (2009). Available at https://static1.squarespace.com/static/5b3eb1d15ffd20967f12cded/t/5bdf49aa2b6a28f991400342/1541360043309/ReflectionsonTheNightJourney_tfullerton_small.pdf.

Nintendo

Nintendo was founded on September 23, 1889, by Fusajiro Yamauchi as a manufacturer of a Japanese type of playing cards known as hanafuda. While Nintendo's name is most commonly translated as "leave luck to heaven," others have argued that the name simply means "the company allowed to make hanafuda cards" (Gorges 2012).

By the mid-1930s, Nintendo was the largest card manufacturer in Japan. By the 1960s, however, the market for playing cards waned, and Nintendo experimented with a wide variety of businesses, including a taxi company, instant noodles, a television station, and even a "love hotel" that rented rooms by the hour (Gorges 2012).

Around 1970, Nintendo released an extendable toy arm known as the Ultra Hand that became a surprise hit and would chart the course for Nintendo's future. Invented by Gunpei Yokoi, the Ultra Hand would sell 1.2 million units and led Gunpei to create a number of other toys, including a periscope, a pitching machine that threw softballs that could be safely used indoors, a "love tester," at-home light gun games, Color TV-Game systems that played *PONG*-like games, and even "laser" shooting ranges in former bowling alleys (Gorges 2012).

A Super Nintendo Entertainment System (SNES) console and controller atop a spread of SNES cartridges. (Robtek/Dreamstime.com)

Although Shigeru Miyamoto credits *EVR Race* (1975) as Nintendo's first video game, *EVR Race* was an electromechanical game rather than an electronic game, and though it was Nintendo's first entry into arcades, it was more in line with other electromechanical games, such as slot machines or pinball than video games, and is therefore not Nintendo's first arcade video game (Iwata n.d.). *EVR Race* was a horse racing game playable by up to six people. It was quite a large game that used a videotape system to show the "races" for which players would try to guess the winning horse. Because it was quite large and mechanical in nature, it was prone to breaking down and required a great deal of maintenance (Iwata n.d.).

Nintendo released its first purely electronic video games in 1978 with the release of *Computer Othello* and *Block Fever*. The company then entered the handheld gaming market in 1980 with the Game & Watch series. Allegedly inspired by seeing a man on a train idly pressing buttons on a handheld calculator, Gunpei Yokoi created this precursor to the Nintendo Game Boy. The Game & Watch games were fairly primitive devices that had monochrome LCD graphics and did not have cartridges but were single-game devices. By the time the last Game & Watch game was released in 1991, Nintendo had released fifty-nine games in the line in a number of form factors (Gorges 2012). In addition to being Nintendo's first handheld series, some of the Game & Watch games had features that Nintendo would reuse in the future, such as the X-shaped directional thumb pad, dual screens in a configuration similar to that of the Nintendo DS, and the form factor of the Game Boy Micro (Gorges 2012).

In 1980, Nintendo also branched out to North America by opening an office in New York (in 1982, it would move its headquarters to Seattle, Washington) (Kent

2001). It was during this time that the *Radar Scope* (1980) arcade game was released in North America. The first game to be released in the United States under the Nintendo name, *Radar Scope* was a commercial failure, but it is notable because its hardware would be reused for 1981's *Donkey Kong*, which was the first game by Shigeru Miyamoto and introduced the Mario character (Gorges 2012).

At the time, Nintendo was not manufacturing a home console system; therefore, in 1982, it sold the rights to make a console version of *Donkey Kong* to Coleco, which released the game for the Atari VCS 2600, the Mattel Intellivision, and its own ColecoVision (Kent 2001). The decision to sell Coleco the rights for console versions of *Donkey Kong* came back to haunt Nintendo in 1983, when Coleco attempted to release a version of *Donkey Kong* for its own ADAM computer, which was an add-on to the ColecoVision (Kent 2001). Nintendo had only sold Coleco console rights and had sold home computer rights to Atari, which had made a version of *Donkey Kong* for its own line of home computers. Although Coleco claimed that the ADAM was a computer with a video game system built inside, it soured Atari's relationship with Nintendo (Kent 2001).

The effects of Coleco's attempt to release *Donkey Kong* on the ADAM went far beyond that one game; at the time, Nintendo was developing its own home console, and Atari was negotiating to be the system's worldwide distributor. When Atari found out about Coleco's version of *Donkey Kong*, the negotiations stalled; therefore, in 1985, Nintendo released the console to the American market independently as the Nintendo Entertainment System (NES) (Kent 2001).

This was not the last time Atari and Nintendo had tense business negotiations. The two companies tangled again when Atari attempted to bypass the copy protection system on the NES. This conflict came about when Atari attempted to make games for the NES without receiving Nintendo's permission. Atari did not have the foresight to include copy protection mechanisms in its cartridges, which allowed anyone to make games for the 2600, but Nintendo learned from Atari's oversight and added copy protection to its cartridges, which meant Nintendo controlled how many games a company could release for the NES. When Atari attempted to bypass this copy protection by releasing unauthorized games such as *Tetris* (1984) under the Tengen label, Nintendo took Atari to court and won (Kent 2001).

In the years since the appearance of the NES, Nintendo has released a number of video game systems, including the Game Boy, Virtual Boy, the Super Nintendo Entertainment System (SNES), the Nintendo 64, the Nintendo GameCube, and the Nintendo Wii. According to Nintendo's corporate financial statements, Nintendo made more than $1.6 billion in 2017; since 1983, it has sold more than 3.2 billion video games and more than 535 million hardware units globally (Nintendo n.d.). Since the release of the NES, Nintendo has been challenged by seemingly countless console manufacturers, such as SEGA during the SNES and N64 era and Sony and Microsoft during the GameCube and Wii eras. Although some of them have temporarily been more successful than Nintendo, none of them have been in the business as long, and none are as well loved as Nintendo.

Bryan-Mitchell Young

See also: Generations of Technology

Further Reading

Gorges, F. *The History of Nintendo*. Vol. 1. Translated by R. Mourlanne. Triel-sur-Seine, France: Pix'N Love Publishing, 2012.

Inoue, O. *Nintendo Magic: Winning the Videogame Wars*. 1st ed. New York: Vertical, Inc., 2010.

Iwata, Satoru. "Iwata Asks: Punch-Out!!" Nintendo. Accessed September 25, 2020. Available at http://iwataasks.nintendo.com/interviews/#/wii/punchout/0/0.

Kent, Steven L. *The Ultimate History of Video Games: From Pong to Pokémon and Beyond*. Roseville, CA: Prima, 2001.

Nintendo. "Financial Data." Accessed September 25, 2020. Available at http://www.nintendo.co.jp/ir/en/finance/index.html.

Sheff, David. *Game Over: How Nintendo Zapped an American Industry, Captured Your Dollars, and Enslaved Your Children*. New York: Random House Inc., 1993.

Nintendo DS

The Nintendo DS is a handheld video game console that was released in 2004. It has gone through three stages of redevelopment: the DS Lite in 2006, the DSi in 2008, and the DSi XL in 2009. The DSi versions had hardware upgrades, including increased RAM and CPU. In 2011, the Nintendo 3DS was launched. The new console was primarily for playing 3-D games, but it retained backward compatibility with DS games. The DS is highly successful, having sold more than 150 million units globally by the end of 2016. Despite widespread software piracy, games and other software also sold well, with more than fifty-five titles shipping more than a million units by the end of 2009.

DS stands for "developer's system" or "dual screen." The console is characterized by its clamshell design, which features two LCD screens; the lower one is a touchscreen operated by a stylus. The console has two microprocessors, one dedicated to sound and the other to graphics. Games are stored on ROM cartridges that are inserted into the console, and the original DS and the DS lite also have slots for Game Boy Advance cartridges. The DS has a "Download Play" feature that allows for multiplayer games using only one game cartridge; the feature works with local Wi-Fi connections and allows other consoles to download the necessary data from the console with the game cartridge.

The DS can be networked with other DS consoles, either locally or remotely, through the free Nintendo Wi-Fi Connection, and many games make use of this feature. The DS features its own chat program, PictoChat, that allows communication between consoles. After 2006, it was also possible to connect a DS console to the internet; at first, this required the purchase of a separate accessory, the Nintendo DS Browser, but this was eventually made available for free through the DSiWare shop.

The DS was aimed at nontraditional markets. High-profile advertising campaigns prominently featured female celebrities—such as America Ferrera, Nicole Kidman, Beyoncé Knowles, Liv Tyler, and Carrie Underwood—endorsing the product. Some game software catered to and reflected the nontraditional demographic: *Brain Age: Train Your Brain in Minutes a Day* (Nintendo SSD, 2006), *Flash Focus: Vision Training in Minutes a Day* (Namco Bandai, 2007), and *Personal Trainer: Cooking* (Indies Zero/Nintendo NSD, 2008). Traditional Nintendo licenses also sold well, such as *Animal Crossing: Wide World* (2005), *The Legend of Zelda: Phantom Hourglass* (2007), *Mario Kart DS* (2005), *New Super Mario Bros.* (2006), and *Super Mario 64 DS* (2004). However, the top-selling DS game, with more than twenty-three million sold by 2016, was *Nintendogs* (2004), a new title specifically designed for the DS.

Thomas H. Apperley

See also: Generations of Technology; Handheld Games

Further Reading

Tobin, Samuel. *Portable Play in Everyday Life: The Nintendo DS*. New York: Palgrave MacMillan, 2013.

Nintendo Entertainment System (NES)/Nintendo Famicom

Few home video game consoles have had such an impact on the video game industry as the Nintendo Entertainment System (NES). Released in the United States in 1985, it revived the market after the video game industry crash of 1983. American retailers that had sold video games in the last years had been stuck with large inventories of poor-quality cartridges made by soon-to-be-bankrupt game developers that had to be cleared out at ludicrous sale prices. As far as they were concerned, home video game systems had been a momentary trend that had ended. Consumers had been burned by relatively expensive products that were often cheap imitations without much novelty, and confidence in Atari (the market leader) was low following the debacles of *E.T.: The Extra-Terrestrial* (1982) and *Pac-Man* (arcade version, 1980; Atari VCS 2600 version, 1981) for the 2600 system. Many game developers either went under or focused on the personal computer or the arcade market.

Across the Pacific, however, video games were still highly popular in Japan, mainly in the form of arcades but also with home video game systems imported and distributed by Japanese companies. The first Japanese-designed home video game systems were Nintendo's Color TV-Game series, which were dedicated consoles that each played a single built-in game. The first Japanese cartridge-based systems that offered multiple games were the Nintendo Famicom and the SEGA SG-1000, both released on the same day: July 15, 1983. Designed from the beginning as an inexpensive console to manufacture, the Famicom had its launch marred by technical problems and a high failure rate, limiting immediate success. After Nintendo issued a product recall and fixed its hardware, it steadily sold more and more through its first years, to the point where Nintendo's president, Hiroshi Yamauchi, envisioned exporting it to the United States. Minoru Arakawa and Howard Lincoln, heading the newly created Nintendo of America, presented the Advanced Video System (AVS) at the 1985 January Consumer Electronics

Show. At this point, the machine featured a keyboard, wireless infrared controllers, and a tape backup drive. Reaction to the system was lukewarm; the quality of its games was impressive, but merchants were not willing to take a risk on video games, especially given that the feature set of the AVS made it seem like the ghost of recent failures in the home computer market, such as the Texas Instruments 99/4A and the Coleco ADAM. Arakawa and Lincoln had the system redesigned to focus solely on games and rechristened the machine the Nintendo Entertainment System (NES).

It turned out that one of the biggest hurdles the Famicom had to overcome on its journey overseas was the resistance of retailers. To convince them to carry and sell the system, Nintendo had to redesign it to make it appear as something other than a "video game console." Nintendo developed the Zapper (a light gun) and R.O.B. (the Robotic Operating Buddy), a robot toy that could "play" a few games specially designed for it. The main function of these two additional pieces of hardware was to create a shift in perception for retailers. The new name, Nintendo Entertainment System, together with the accessories portrayed the machine as a technological toy for children and a home station for arcade shooting games, such as *Wild Gunman* (1984) and *Hogan's Alley* (1984). The Zapper had a degree of success on its own, as fifteen or so games were made compatible with it. R.O.B., however, was for all intents and purposes a stillborn, costarring in only two titles that were launched simultaneously with the console, *Gyromite* (1985) and *Stack-Up* (1985). Although the reenvisioned NES was a more interesting proposition, Nintendo still had to come up with no-risk policies to persuade retailers: the company would handle all in-store displays and buy back any unsold systems after ninety days. On these conditions, five hundred retailers opted in for the test marketing of one hundred thousand consoles on October 18, 1985.

Aided by an aggressive multimillion-dollar marketing campaign from Nintendo of America, the test launch in New York City was successful enough to expand to Los Angeles. An enduring marketing and advertising campaign put NES sales beyond one million at the end of its first nationwide release year and eventually made it "the best-selling toy in America" in 1988. Nintendo's market share of the video game business has been reported alternately as 83 percent of North America (McGill 1988, 2), "somewhere between 86 to 93 percent" (Kent 2001, 360), 90 percent of the Japanese market (Sheff 1999, 147), and "85 to 90 percent on both sides of the Pacific" (Sheff 1999, 223). Whichever number one holds to be true, the fact remains: "Nintendo power" was absolute. According to Nintendo's publicly disclosed historical data, lifetime sales of the Famicom/NES are tallied at 34 million units in the Americas and 61.91 million units worldwide. Its closest competitor was the SEGA Master System, released eight months after the NES in June 1986; its lifetime sales are estimated to 13 million units worldwide, the majority of which were in markets Nintendo had not entered into quickly enough, mainly Brazil, Europe, and Asia.

The 8-bit NES finally died out because of competition from the technologically superior 16-bit systems. In Japan, the Nippon Electric Company (NEC) released the PC-Engine as a response to the NES's monopoly and seriously threatened it. SEGA tried releasing its 16-bit SEGA Genesis/SEGA Mega Drive console in Japan and North America to expand its customer base, hoping its advanced hardware would sway consumers from Nintendo mania. Incidentally, SEGA's push also dug the grave for NEC's PC-Engine, which appeared in North America as the TurboGrafx-16, but too late and without SEGA's arcade hits to make a serious impact on consumers and convince game developers to work on the console. The announcement of the PC-Engine in Japan prompted Nintendo to develop a follow-up, the Super Famicom, which was released in 1990 in Japan and then in 1991 in North America as the Super Nintendo Entertainment System (SNES). The SNES rendered the NES obsolete save for budget-conscious video game consumers. A new, redesigned version of the console dubbed the "New NES" or "NES 2" appeared in 1993 as a last-ditch effort to maintain consumer interest; however, people had either adopted the Super NES or the Genesis by then, and it did not create much of an impact.

MARKETING STRATEGY AND LICENSING POLICIES

Nintendo's approach to video game production marked a significant shift from its predecessors. Every prior game console, be it the Magnavox Odyssey, Atari VCS 2600, ColecoVision, or Mattel Intellivision, was initially envisioned as a closed system for which only the console manufacturer would develop games for its own machine. When dissatisfied Atari programmers left the enterprise to form their own game development studio (Activision), Atari sued to prevent them from encroaching on its market, but when it became apparent Atari would lose after two years of trial, it settled for a royalty arrangement. The popularity of home video games led Atari to a generalized laissez-faire attitude, with the belief that consumer demand would keep expanding or sort out the weaker offerings through the principles of the free market. But as many companies flocked to game development for the 2600, the market became crowded with second-rate titles, companies pulled out, and retailers liquidated unsold inventories, contributing to the industry crash of 1983.

Whereas Atari was profiting from its game console sales, Nintendo's business model was to develop a console that had a technological edge on its rivals and yet sell it cheaply—at minimal or no profit. Money would come from the sale of software, so the plan called for no competitors to encroach on Nintendo's private walled garden and steal its customers. However, Nintendo's marketing approach faced a problem: how can a single firm offer enough games to satiate consumer demand? As Nintendo could not feed enough games to consumers, it needed partners. Contrary to Atari, Nintendo would impose very strict regulations of quality control on its partners for the privilege of accessing the walled garden of the Famicom/NES, and the licensing agreements carried hefty prices.

Taito, Namco, and Bandai—three Japanese game developers responsible for, among other games, *Space Invaders* (1978) and *Pac-Man* (1980)—were the first to be courted by Nintendo on amiable terms to build support for its console. As the Famicom's success grew, Nintendo licensed more developers and exported it to North America. Mindful not to repeat the flood of weak titles that caused the crash of 1983, strict licensing policies were introduced to developers willing to make the lucrative jump over the Pacific. The first of these was that a Nintendo of America licensee was required to submit every game it wanted to distribute through Nintendo for “quality control,” and Nintendo had the right to demand any change it saw fit. A properly licensed game would receive the Nintendo Seal of Quality, a device that aimed at inspiring confidence in customers that Nintendo had tested and approved the game. In practice, however, it merely meant that the licensee had paid the fees and done business according to Nintendo’s terms. Nintendo was not providing testing services to developers to strengthen its games, but it was monitoring the content carefully to make sure nothing objectionable appeared.

More than anything, Nintendo did not want games such as *Custer’s Revenge* (1982) and *Beat ’Em & Eat ’Em* (1982) (two pornographic titles that appeared for the Atari 2600 that caused controversy and ultimately tarnished Atari’s image) damaging its efforts to market the NES to kids. The Nintendo of America reviewers examined each game and asked the developer to remove any content that did not fit with Nintendo’s family-friendly policy, including illegal drugs, explicit or suggestive sexuality, alcohol, smoking materials, graphic depictions of death, gratuitous or excessive violence, foul language, or ethnic, religious, nationalistic, or sexual stereotypes in language or symbols. The censors’ reach proved wide ranging, to say the least; for example, because the image of the cross was taken to be a symbol of Christianity, it had to be removed from hospitals and tombstones. Such an alteration can be found in Capcom’s *DuckTales* (1990), where the coffins in Transylvania bear a cross in the Japanese Famicom version but the letters R.I.P. appear in the American NES cartridge. (See Crockford 1993 to get an overview of the relationship between game developers and Nintendo’s regulators.)

Although censorship of content was an issue for many licensees, it was nothing compared to the economic structure involved in producing NES games. Licensees were restricted to developing a maximum of five games per year; Nintendo’s rationale was that it would force them to commit time and resources to make each of these games good. In practice, two developers (Konami and Acclaim) circumvented this rule by creating subsidiaries (Ultra Games and LJN) that could also publish a maximum of five games. In addition to the limit of five games a year, every game published on the NES had to be exclusive to that console for a period of two years. In the video game landscape of the time, this usually meant not making another version at all, because in two years’ time, a game would have been rendered obsolete by its contemporaries. Perhaps most decisively, however, Nintendo also held a patent for the physical game cartridges of the NES and was their sole manufacturer. Third-party developers had to buy a cartridge lot from Nintendo (with a minimum of ten thousand units), in cash and in advance. The deal was as one-sided as can be conceived: “Nintendo was paid about 2,000 yen per cartridge by the licensees, about twice what it took to produce them. . . . Companies, particularly small licensees without deep cash reserves, had to risk perilous amounts of capital on large orders if they wanted to gamble on big successes. They shouldered all the risk while Nintendo collected obscene profits” (Sheff 1999, 59). In 1991, the profits in question are said to have been $1.5 million—*per employee*.

As the NES’s popularity—and the number of third-party licensees—soared, manufacturing and supply issues began to appear. The company rationed its cartridges according to its supplies but also to its own releases. Many claimed Nintendo deliberately denied large quantities of cartridges to licensees when it was on the verge of releasing a big title so that no competition would prevent Nintendo games from selling. Some of the other tactics coined as “inventory management” by Nintendo of America included withholding goods from retailers that sold Nintendo games and systems under the suggested retail price (causing devaluation of Nintendo’s products in consumers’ minds) as well as undersupplying merchants to keep demand artificially high. This approach is a stark contrast to Atari’s laissez-faire and illustrates how control over the manufacturing and distribution of games was the keystone of the Nintendo Economic System, the NES behind (and before) the Nintendo Entertainment System (NES).

Eventually, the U.S. Federal Trade Commission (FTC) started an inquiry into allegations of price fixing under antitrust laws. Nintendo settled and managed to get away with what could very well be the most lenient sentence in video game corporate history: it would issue $5 rebate coupons to customers who had bought a Nintendo product between June 1, 1988, and December 1, 1990. The coupons could be redeemed on the purchase of a new Nintendo product, thus guaranteeing more sales and profits. Nintendo claimed its various policies on censorship, game release limits, exclusive cartridge manufacturing, and control of distribution were put in place to protect the market from oversaturation and poor-quality titles. This was certainly true to an extent, but many game developers saw them as bullying tactics to coerce them into disadvantageous deals based on Nintendo’s iron grip on the home video game market.

Nintendo’s enforcement of its regulations was ensured by three things: (1) its patent and control on game cartridges, (2) the Official Nintendo Seal of Quality (the absence of which signified to consumers that a title was not “official”), and, more important, (3) the 10NES lockout chip. This special chip that functioned as a “lock” is the chief difference between the Japanese Famicom and the Occidental NES. Nintendo had copyrighted a strip of computer code that constitutes a “key” and included it in every cartridge it manufactured. If a cartridge without this code (and hence manufactured independently by an unauthorized game developer) was inserted in the NES, the game program was not executed; instead, the console entered a self-resetting routine (usually displaying a blinking blue or gray screen). Unfortunately, over the years, the great majority of NES owners have grown accustomed to seeing these patterns on legitimate cartridges, as hardware degradation caused by dust, moisture, or rough handling often rendered the boot-up code difficult to read. Unless both the cartridge and console connectors were absolutely clean and properly aligned, the 10NES chip would refuse to launch the game. Compounding this problem, the nonstandard front-loading and push-down design of the cartridge port (that earned the NES its “toaster” moniker) meant cartridges could be slightly nudged (and misaligned) inside the console and made removing dust particles almost impossible without blowing in the port; yet, in so doing, saliva oxidized the connectors and made the console even more difficult to operate afterward. The problem was so widespread that Nintendo marketed the NES Cleaning Kit to help consumers take care of their systems. The 10NES chip turned out to be such a problem that Nintendo removed it from its NES 2, which was also redesigned with a standard top-loading cartridge port.

GAME LIBRARY AND PIRACY

Although the 10NES created multiple additional issues for the NES over the Famicom, it served its primary purpose well. Few unauthorized games appeared for the NES, both because of the technical hurdle of overcoming the lockout chip and because of Nintendo's unrelenting legalistic pursuit of offenders. The most famous of these cases is undoubtedly the *Tetris* debacle, in which rogue developer Tengen (a subsidiary created by Atari) reverse-engineered the 10NES chip to input the key code in its own cartridges, entirely bypassing Nintendo's licensing process. Nintendo promptly sued, and the two parties settled, on the condition that Tengen recall its cartridges and refrain from selling them. One notable exception to escape Nintendo's wrath was Wisdom Tree, an unauthorized developer of Christian games, such as *Bible Adventures* (1991) and *Exodus* (1991); Nintendo did not dare sue for fear of generating bad press in the United States.

In Japan and Asia, where the Famicom had no hardware measures of control, game piracy was a significant problem. Rogue developers would generally produce one of four types of products: multicart games, clones, "retroports," or original games. Multicarts (multigame cartridges) were collections of games (some of the most popular included seventy-six or two hundred games); most of them were pre-1985 arcade or Atari-era games, and the head count was artificially inflated by counting, for instance, three versions of the same game with different difficulty levels as three games. Clones were created by taking a current game and changing a few minor graphical assets (graphics hacks). Today, one can find on the internet evidence of games such as *Mario 6*, a conversion of *Tiny Toon Adventures* (1991) in which Buster Bunny has been replaced by Mario, and *Mario 16*, which repeats the experiment with *Joe & Mac* (1991).

Retroports are a more interesting phenomenon; here, the pirate game developer takes a next-generation game (destined for the 16-bit SNES, SEGA Genesis, or Sony PlayStation) and adapts it for the 8-bit NES so that markets and consumers technologically left behind can still enjoy the newest games in some form—and the developer, of course, gets to make easy money. A few of the games to have received this treatment include SNES smash hits such as *Super Mario World* (1990), *Contra III: The Alien Wars* (1992), and *Final Fantasy VII* (1997). Original pirate games are, compared with the other forms of pirate production, more uncommon and generally of lesser quality; they also often reuse graphics from other high-profile games.

The NES/Famicom's success is mainly a result of the restrictive and controlling licensing policies of Nintendo and the excellent quality of its game library rather than its technical superiority. It was an average-power console for its days; Nintendo president Hiroshi Yamauchi's primary directive—to have it *cheap*—was at odds with being state of the art, but it was cleverly engineered by Masayuki Uemura around a pair of 8-bit processors with one dedicated solely to graphical processing, instead of a costly 16-bit processor. In technical terms, the NES could display up to eight moving objects (sprites) per scanline and up to sixty-four at once on the screen. Each of these sprites could contain four colors taken from the console's impressive palette of fifty-two, and sixteen of them could be displayed at any one time on the screen. These significant capabilities resulted in vibrant, colorful graphics and smooth, fast action. The console was also designed to be expandable via the Zapper and R.O.B. peripherals previously mentioned as well as a music keyboard, computer keyboard, and disk drive, among others (many accessories were released only for the Famicom in Japan).

Most notable, however, is the fact that the cartridges themselves could contain expanded functions in the form of special chips designed by game developers called Multi-Memory Controllers. Nintendo's MMC1 chip introduced battery-backed save games, the MMC2 allowed the console to portray larger moving objects, the MMC3 optimized split-screen scrolling, and so on.

Finally, one of the NES/Famicom's strong suits was sound and music. With its five sound channels, the console's hardware was leaps and bounds ahead of its predecessors (the Atari 2600 had only two and the Commodore 64 only three). Two square waves and a triangle pulse could simulate different instruments, such as a piano, harp, or guitar and a bass or flute, respectively; a noise channel was mainly used for percussions and sound effects; finally, the DPCM channel could play back sampled sounds—in very low fidelity, as the digitized speech in JVC's *Star Wars: The Empire Strikes Back* (1992) or Konami's *Blades of Steel* (1988) can attest. Using this channel for sampled drum sounds was a more popular alternative (most Konami games demonstrate this as well as the bass drum sound in *Super Mario Bros. 3* [1988]).

The strength of the NES library can be readily assessed both in terms of games that sold more than one million copies (moreover at a time when the market was less sizable than in later generations) and games that have launched long-term franchises. According to Nintendo's official numbers, in total, five hundred million NES cartridges were sold. Million sellers are, in quantity, chiefly games developed by Nintendo, including its sports series titles (*Golf, Baseball*, *Soccer*, *Tennis*, and *F1 Race*) and various others, such as *Excitebike* (1985), *Tetris* (1989), *Dr. Mario* (1990), and *Kid Icarus* (1987). Third-party developers also contributed many games to that canon, including Capcom's *Chip 'n Dale Rescue Rangers* (1990) and *DuckTales* (1989), and many more were adaptations from successful arcade games, such as Konami's *TwinBee* (1985) and *Gradius* (1985), Namco's *Xevious* (1982), and Capcom's *Commando* (1985) and *Ghosts 'n Goblins* (1985). Numerous high-profile (and lucrative) game series met with success on the NES: Konami's *Teenage Mutant Ninja Turtles, Castlevania*, and *Metal Gear*; Capcom's *Mega Man*; Square's *Final Fantasy*; Enix's *Dragon Warrior*; and Hudson Soft's *Bomberman* and *Adventure Island* series. Of course, the real winner in this category of million-selling games is Nintendo and its franchises, which include *Super Mario Bros.*, *The Legend of Zelda*, *Donkey Kong*, *Metroid*, and *Punch-Out!!* Widening the scope of this overview beyond the purely arbitrary one-million-copies commercial considerations to include well-received and influential titles as well—games and franchises such as *Ninja Gaiden*, *Adventures of Lolo*, *Double Dragon*, *Blaster Master* (1988), *Bionic Commando* (1987), *Ice Hockey* (1988), *River City Ransom* (1989), *Crystalis* (1990), *StarTropics* (1990), and *Battletoads* (1991)—merely scratches the surface of the console's offerings.

Today, the NES's legacy lives on in a number of cultural practices. By virtue of its quasi monopoly on the home video game market between 1985 and 1990, the NES is often held as the sole representative of third-generation home video game systems. This gives it the lion's share of the retrogaming current that has been growing in popularity since the beginning of the twenty-first century, in no small part thanks to emulators. Nintendo has been actively capitalizing on its back catalog of games through the Nintendo Wii's Virtual Console channel, where gamers can buy and download selected games from the NES library, and then the Nintendo Switch Online subscription service. In 2016, the company released the NES Classic (or Nintendo Classic Mini in different markets), a dedicated miniature replica console with controllers that features a fixed library of thirty preinstalled games with no cartridge port. The item was sold-out in record time and became a rarity and collector's item, which led Nintendo toward subsequent production runs before discontinuing the miniconsole in 2018.

The NES also lives through new productions inspired by retro aesthetics. Capcom's thriving *Mega Man* series that debuted on the NES had a follow-up in 2008, *Mega Man 9*, that was made exactly in the image of the original 8-bit games in its structure, general gameplay, graphical aesthetics, music, sound, and, most significantly, difficulty level—much to the joy of retrogamers, whose embracing of the title prompted the developer to release *Mega Man 10* (2010). A slew of independent games soon took on the colors and sounds of NES aesthetics, including Yacht Club Games' *Shovel Knight* (2014), Thomas Happ Games' *Axiom Verge* (2015), and Sabotage Studio's *The Messenger* (2018). Morphcat Games is even releasing a physical NES cartridge of its game *Micro Mages* in 2019.

The aesthetic practice of speedruns, in which expert gamers run through a game in the quickest possible way by careful planning, feats of agility, and exploitation of bugs, also prominently feature NES titles: as of late 2019, one of the largest online speedrun archives, TASVideos, listed 308 movies of NES/ Famicom games out of a total of 1806, the rest being split among no less than thirty systems.

Finally, for chiptune scene musicians, the sounds from the NES occupy a place of choice, seconded by the Commodore 64 and the Nintendo Game Boy. These aesthetic, cultural, and economic afterlives all contribute to the platform's enduring success in video game culture.

Dominic Arsenault

See also: Nintendo

Further Reading

Altice, Nathan. *I AM ERROR: The Nintendo Entertainment System.* Cambridge, MA: MIT Press, 2015.

Crockford, Douglas. "The Untold Story of Maniac Mansion." *Wired* 1, no. 4 (1993). Available at http://www.wired.com/wired/archive/1.04/nintendo.html.

Kent, Steven L. *The Ultimate History of Video Games*. New York: Three Rivers Press, 2001.

McGill, Douglas. "Nintendo Scores Big." *New York Times*, December 4, 1988. Available at http://www.nytimes.com/1988/12/04/business/nintendo-scores-big.html.

Nielsen, Martin. "The Nintendo Entertainment System (NES) FAQ." *Digital Press*, 1997. Available at https://www.digitpress.com/faq/nes.htm.

Sheff, David. *Game Over: Nintendo's Battle to Dominate an Industry*. London:

Hodder and Stoughton, Vintage Books, 1999.

Nintendo Famicom. *See* Nintendo Entertainment System/ Nintendo Famicom

Nintendo Game Boy

Since its introduction in 1989, the Nintendo Game Boy line has included seven different models, and, according to Nintendo's investor relations documents, the Game Boy line has sold more than two hundred million hardware units worldwide. Although the Game Boy is one of Nintendo's most well-known handheld devices, it was not their first. The Game Boy line was preceded by Nintendo's Game & Watch series, which were first released in 1980 (Crigger 2007). Game & Watch games were small devices with a monochrome LCD screen and only a single built-in game. Interestingly, some of the Game & Watch devices had dual screens and looked similar to the much later Nintendo DS line.

In the late 1980s, the Nintendo Entertainment System (NES) was a huge success, and Nintendo decided to make a more advanced cartridge-based handheld game system. The task of creating the new system fell to Gunpei Yokoi, the creator of the Game & Watch line, who would later go on to create the Nintendo Virtual Boy.

Although the Game Boy was not the first handheld game console to use interchangeable cartridges (that honor belongs to Milton Bradley's Microvision that was released in 1979), it was the most successful one of all time (Fahs 2009). However, when it was released in Japan on April 21, 1989, and in North America on July 31, 1989, it was far from certain that it would be a success (Parish 2015). Its two-inch black-and-white screen and Sharp-produced custom Z80 processor were inferior to other handheld consoles, such as the Atari Lynx, the TurboExpress, and the SEGA Game Gear, which all had color screens and were released in the months after the Game Boy hit the market (Kent 2001). In his book *Game Boy World 1989*, Jeremy Parish (2015) argues that these were strengths rather than weaknesses: the processor was well known to programmers, which meant it was cheap to develop games for it; the hardware itself was cheap; and it had the Nintendo name going for it. Moreover, the low-end hardware meant that its batteries lasted at least ten hours compared with the two and a half hours of competing systems. Although these factors were important, perhaps more important was the fact that the original Game Boy came with one of the most popular games of all time: *Tetris* (1984).

While the original Game Boy was a huge success, Nintendo made several minor changes before releasing a version with a color screen. The first update came in 1995 when Nintendo playfully acknowledged players' desire for a color version of the Game Boy by releasing the original black-and-white Game Boy in different colored cases as part of its "Play It Loud" campaign (East 2009). The next year saw the release of the Game Boy Pocket, which featured a better and larger but still black-and-white screen. The year 1998 would see the release of the third major revision of the system in the form of the Game Boy Light. Slightly larger than the Game Boy Pocket, the Light included an electroluminescent backlight but was otherwise identical to the Pocket. This system was only released in Japan and has become quite valuable to collectors (East 2009).

The Game Boy finally received a color screen when the Game Boy Color was released in the fall of 1998 (Kent 2001). Although this system had the same processor as the original Game Boy, as Nintendo's U.K. site explains, its clock speed was twice as fast as the original system. Using the original chip made it easy for the Color to play not only new color games but also the black-and-white games of the original Game Boy, which made it quite attractive to customers who could buy the system and have access to the large library of games made for the original Game Boy.

Although faster than the original Game Boy, the Color was still fairly underpowered. According to the *International Business Times,* this was remedied in 2001 when the Game Boy Advance was released. The system featured a 32-bit ARM processor that was said to allow graphics similar in quality to Super Nintendo Entertainment System (SNES) games. Although the system was quite popular, it was criticized for its lack of a backlight, which made it difficult to play in dim lighting. This shortcoming was addressed in 2003 with the release of the Game Boy Advance SP, the fifth major revision of the line. In addition to the backlight, the SP had a new form factor that folded in half when not in use and resembled the original Game Boy when opened.

The final model of the Game Boy was the Game Boy Micro, which was released in September 2005; it was only two inches wide by four inches long. While the Micro was an interesting system, it was released nearly a year after the Nintendo DS. The last game for the Game Boy Advance was released in 2008 (Villapaz 2014).

Throughout its life cycle, the various incarnations of the Game Boy had many accessories released for them. In addition to countless carrying cases and lights, Nintendo also released a camera that took low-resolution black-and-white pictures, a small printer that could print the pictures, a device called the e-reader that read special cards that were swiped through it and would either unlock special features in some games or load small games, and even a multimedia player. Additionally, Nintendo released the Super Game Boy, which allowed the SNES to play Game Boy games, and the Game Boy Player, which allowed the Nintendo GameCube to play Game Boy games.

Although the Game Boy was not the first handheld system and was never the most powerful, it was the most successful and popularized mobile gaming device. The Game Boy line may be gone, but it lives on through its spiritual successor, the DS line, which was the most popular handheld gaming console line in the world (Schreier 2011).

Bryan-Mitchell Young

See also: Handheld Games; Nintendo

Further Reading

Crigger, L. "Searching for Gunpei Yokoi." *Escapist Magazine*, March 6, 2007. Available at http://www.escapistmagazine.com/articles/view/issues/

issue_87/490-Searching-for-Gunpei-Yokoi.

East, T. "History of Nintendo: Game Boy." *Official Nintendo Magazine*, November 11, 2009. Available at https://web.archive.org/web/20110107180322/http://www.officialnintendomagazine.co.uk/article.php?id=13153.

Fahs, T. "IGN Presents the History of Game Boy." IGN, July 27, 2009. Available at https://www.ign.com/articles/2009/07/27/ign-presents-the-history-of-game-boy.

"Forgotten Giant: The Brilliant Life and Tragic Death of Gunpei Yokoi." *Game Informer* no. 105 (January 2002): 116.

Kent, Steven L. *The Ultimate History of Video Games: From Pong to Pokémon and Beyond*. Roseville, CA: Prima, 2001.

Parish, J. *Game Boy World 1989*. n.p.: CreateSpace, 2015.

Schreier, J. "Nintendo DS Line Outsells PlayStation 2, Nintendo Says." *Wired*, January 4, 2011. Available at https://www.wired.com/2011/01/nintendo-ds-sales/.

Villapaz, Luke. "Nintendo Game Boy 25th Anniversary: The History of the Handheld Console That Shaped a Generation of Gamers." *International Business Times*, April 21, 2014. Available at https://www.ibtimes.com/nintendo-game-boy-25th-anniversary-history-handheld-console-shaped-generation-gamers-1574211.

Nintendo GameCube

The Nintendo GameCube was a sixth-generation game console. A successor to the Nintendo 64 (N64), the system was Nintendo Corporation's fourth entry in the home console market. First unveiled at Nintendo's Space World (now Nintendo World) event in 2000, it was officially released in Japan on September 14, 2001; in North America on November 18, 2001; and in Europe on May 3, 2002.

The GameCube's 486 MHz "Gekko" microprocessor was developed by IBM, based on custom-modified 32-bit PowerPC architecture. The system was equipped with 24 MB of main memory as well as a 16 MB buffer for DVD operations and audio playback. An additional 3 MB of memory were embedded in the "Flipper" graphics processing unit. Developed cooperatively by Nintendo and ArtX (soon thereafter acquired by ATI Technologies), the 162 MHz chip was capable of peak performance in excess of twenty million polygons per second. It supported hardware transform and lighting; full-scene anti-aliasing; bilinear, trilinear, and anisotropic texture filtering; multitexturing; bump mapping; and 24-bit z-buffering. The custom audio processor was capable of producing sixty-four channels of CD-quality (16-bit, 48 kHz) sound. The system supported standard definition video output, both interlaced and progressive scan, as well as Dolby Pro Logic II–compliant stereophonic sound.

The Nintendo GameCube home video game console system and a controller. (Jorgeprz/ Dreamstime.com)

The GameCube was the first Nintendo console to abandon game cartridges in favor of optical medium, the Nintendo GameCube Game Disc—a mini-DVD-based proprietary format developed by Matsushita (now Panasonic). The eight-centimeter disk held approximately 1.5 GB of data. Memory cards, ranging from 512 KB to 4 MB, provided additional, rewritable storage.

Determined not to repeat the mistakes made with the N64, Nintendo consciously aimed to improve relations with third-party developers. Consequently, from day one, the GameCube enjoyed relatively strong third-party support, both in the form of exclusive and multiformat releases. Competitively priced at $199, the system launched to generally positive reviews. Nonetheless, the initial sales failed to reach the projected levels, in part because of timing. Released almost a full year after the Sony PlayStation 2, the GameCube found itself in a position similar to that of its predecessor: it was competing against a firmly entrenched rival with an already sizable software library. The situation was further exacerbated by the console's relatively lackluster launch lineup. Although games such as *Luigi's Castle* (2001), *Super Monkey Ball* (2001), *Wave Storm: Blue Storm* (2001), and *Star Wars Rogue Squadron II: Rogue Leader* (2001) were well received, they did not attain the status of must-own titles.

In mid-2002, in response to price drop announcements from Sony and Microsoft, the system's price was reduced to $149. Despite this, sales continued to lag. With GameCube's disappointing performance in the U.S. market and overseas sales deflating as the yen appreciated against the dollar, Nintendo posted its first loss in history, 2.9 billion yen for the first half of fiscal 2003. Facing considerable inventory backlog (estimated in millions of units), the company temporarily halted GameCube production and, in September 2003, slashed the price to $99.

This finally brought the desired effect. The console continued to sell relatively well throughout 2004 and into early 2005, when interest began to dwindle again, this time because of anticipation of the release of its successor, the Nintendo Wii. Ultimately, the system proved profitable, thanks to low hardware costs and a strong lineup of first-party games. It was discontinued in 2007.

Although not the least successful system of its generation (that dubious distinction belonging to the ill-fated SEGA Dreamcast), with only twenty-two million units sold worldwide, the GameCube was Nintendo's second-worst-selling console, surpassed only by the Nintendo Virtual Boy. Its underwhelming market performance can be attributed to a number of factors. Perhaps most significant of these was the tremendous success of the PlayStation 2, which, by the time of GameCube's release, had already managed to establish a user base of approximately twenty million. Although first-party games sold well throughout the system's life, the same could not be said for third-party offerings. Multiformat titles in particular tended to sell significantly worse on the GameCube than on the Microsoft Xbox and PlayStation 2, leading a number of developers to withdraw their support for the platform. Compared with its competitors, the system lacked CD/DVD playback functionality, a direct consequence of Nintendo's decision to use proprietary optical drive technology. Moreover, online play support was extremely limited. Released in 2002, the GameCube Broadband Adapter and Network Adapter added online connectivity to the system's features; however, only four games (including one exclusive to Japan) took advantage of it.

An interesting variant of the GameCube hardware was released in December 2001 in Japan. Manufactured by Matsushita and officially licensed by Nintendo, the Panasonic Q was a hybrid game/multimedia system capable of CD, DVD, and MP3 playback and fully compatible with GameCube software. Notable GameCube games include *Pikmin* (2001), *Super Smash Bros. Melee* (2001), *Animal Crossing* (2002), *Eternal Darkness: Sanity's Requiem* (2002), *Metroid Prime* (2002), *Super Mario Sunshine* (2002), *The Legend of Zelda: Wind Waker* (2003), and *Resident Evil 4* (2005).

P. Konrad Budziszewski

See also: Generations of Technology; Nintendo

Further Reading

Holder, Steven D. *The Nintendo GameCube*. n.p.: CreateSpace, 2015.

Nintendo 64

The Nintendo 64 (N64) was a fifth-generation video game console that was released in Japan on June 23, 1996; in North America on September 29, 1996; and in Europe on March 1, 1997. It was marketed as the first "true" 64-bit system —Nintendo's superior response to the SEGA Saturn and Sony PlayStation (both 32-bit consoles).

Code-named "Project Reality," the N64 was developed jointly by Nintendo and

Silicon Graphics, Inc. At the heart of the system was a 64-bit NEC VR4300 MIPS central processing unit that operated at 93.75 MHz and was supported by a 64-bit Silicon Graphics Reality Coprocessor. The 62.5 MHz coprocessor handled video and audio processing. The N64 could display graphics in 21-bit color, at the maximum resolution of 640-by-480 pixels, and supported hardware z-buffering, anti-aliasing, texture mapping, trilinear filtered MIP mapping, and perspective correction. The system could theoretically produce up to one hundred channels of 16-bit PCM sound, with a maximum sampling rate of 48 kHz.

The N64 had 4 MB of memory and was the first game console to use a unified memory subsystem (rather than dedicated main, video, and audio memory). In 1999, a 4 MB memory expansion unit was released that allowed for higher video resolution, frame rates, or texture quality in supported titles. A few games required it and would not work without it—notably, *Donkey Kong 64* (1999), *The Legend of Zelda: Majora's Mask* (2000), and *Perfect Dark* (2000; in single-player and some multiplayer modes).

The N64 was the last home console to use cartridges. Compared with CD-ROMs, cartridges offered very fast loading times and a significant measure of protection from piracy. However, this was offset by limited storage space (up to 64 MB), a longer production cycle (with a lead time of weeks rather than days), higher production costs (approximately ten times those of CD-ROMs), and a lower profit margin for the developers.

The system, originally scheduled for release in 1995, was delayed several times. Entering the market eighteen months after the PlayStation, the N64 found itself competing against a well-established platform with a global user base reaching seven million and a library of nearly four hundred games. Despite this—and despite the fact that only three games were ready for the Japanese launch—the N64 debuted as the fastest-selling console of its generation. By the time of its North American premiere, approximately 1.2 million units had been sold in Japan. However, the sales soon slumped. Although the system went on to achieve moderate success in the United States, it remained a niche product in Japan.

The N64's primary weakness was limited third-party support. Although efforts from studios such as Factor 5 (*Star Wars: Rogue Squadron* [1998] and *Indiana Jones and the Infernal Machine* [2000]) and Rare (*Golden Eye 007* [1997], *Diddy Kong Racing* [1997], *Banjo-Kazooie* [1998], and *Donkey Kong 64* [1999]) pushed the machine to its limits, meeting or even surpassing the quality of first-party titles, many developers shunned the system because of the limitations of the cartridge format, choosing to create games for the PlayStation instead. This was the case, for instance, with Square and Enix, the developers of the *Final Fantasy* and *Dragon Quest* series, respectively.

Nintendo attempted to provide an alternative to CD-ROM with its Nintendo 64DD (Disk Drive), a peripheral utilizing proprietary 64 MB writeable magnetic disks. First announced before the launch of the N64, the attachment was not released until December 1999, and then only in Japan. A considerable number of games were planned for the 64DD; eventually, only nine were released, with the remaining games canceled or released in cartridge format (such as *The Legend of Zelda: Ocarina of Time* [1998] and *The Legend of Zelda: Majora's Mask* [2000]). The Nintendo 64 was discontinued in 2001, having sold just under thirty-three million units worldwide.

P. Konrad Budziszewski

See also: Generations of Technology; Nintendo

Further Reading

Allen, Mat. “Retroinspection: Nintendo 64.” *Retro Gamer* 31 (2006): 18–23.

Buchanan, Levi. “Nintendo 64 Week: Day One.” IGN, September 29, 2008. Available at https://www.ign.com/articles/2008/09/29/nintendo-64-week-day-one.

Buchanan, Levi. “Nintendo 64 Week: Day Three.” IGN, October 1, 2008. Available at https://www.ign.com/articles/2008/10/01/nintendo-64-week-day-three.

Buchanan, Levi. “Nintendo 64 Week: Day Two.” IGN, September 30, 2008. Available at https://www.ign.com/articles/2008/10/01/nintendo-64-week-day-two.

Nintendo Super Famicom. *See* Super Nintendo Entertainment System/Super Famicom

Nintendo Switch

The Nintendo Switch is an eighth-generation console developed by the Nintendo Corporation and released in March 2017, following the Wii U, Nintendo’s previous console. The system is defined as a “hybrid console,” one that can be used as both a home console and a handheld game. The Switch was first announced on October 20, 2016, with a trailer showcasing its main feature: the seamless transition (or “switch”) from one setting to the other (home or handheld), the possibility to play anywhere, and the integration of multiplayer play (local or over the internet). Sold at a price corresponding to $299, the console was successful from the very beginning, leading to unit shortages around the world. By December 2018, the Switch had sold over 8.7 million consoles in the United States, making it the fastest-selling console in U.S. history. It exceeded the sales of both the PlayStation 4 (PS4) and Xbox One at the same period of their life span (twenty-one months). With over 23 million units sold worldwide less than two years after launch, the console has also rapidly surpassed the total sales of the GameCube (21.74 million) and Wii U (13 million).

Following the low sales of the Wii U, Nintendo hoped to launch a console that would offer a new gaming experience without repeating the same mistakes that afflicted the Wii U’s lifetime cycle. For example, the initial reveal of the Wii U focused on the controller (GamePad) instead of the actual console, leaving consumers wondering whether it was simply an extension of the Wii. The Wii U’s launch was also problematic due to the absence of big-name titles and technical limits that kept it from competing with the already established PlayStation 3 (PS3) and Xbox 360, much less the soon-to-come PS4 and Xbox One. A lack of third-party games further hurt the system’s appeal. Nintendo thus progressively abandoned the Wii U’s support when, in March 2015, then president Satoru Iwata publicly announced the code name of the Switch, the Nintendo NX. After the reveal of the Switch in October 2016, detailed information on the console came to light. Up until launch, Nintendo created a vast marketing campaign, which included multiple trailers, an ad during Super Bowl 50, and a gaming session on *The Tonight Show Starring Jimmy Fallon*. Nintendo's campaign was intended to give the company a fresh start in the console market and to articulate the Switch's concept with greater precision.

The Nintendo Switch comes with a screen, a dock station, and two Joy-Cons. The screen is 6.2 inches, uses LCD technology, and offers a resolution of 1280-by-720 pixels. It also serves as a multitouch-capable touchscreen with a gyroscope and accelerometer. The GPU and CPU are custom-made by Nvidia, and the console's battery (a 4310mAh lithium-ion battery) can last between 2.5 to 6.5 hours, depending on which games are played. To play, users use a Pro Controller or attach both Joy-Cons on small "rails" situated on both sides of the screen. The Pro Controller must be bought separately and offers a traditional controller design. As for the Joy-Cons, they serve as a single controller when attached to the screen. Once detached, they can either be used as one or two controllers. The Joy-Cons include an accelerometer, gyroscope, motion IR camera, HD rumble, and the battery life lasts up to twenty hours. Both Joy-Cons come in different colors; at launch, the only colors available were gray or neon (blue and red). Nintendo now sells bundles with new colors for the Joy-Cons: red for *Super Mario Odyssey* (2017) and green and pink for *Splatoon 2* (2017), among others.

When placed in the dock, the image is relayed to a television screen through the HDMI port. The dock is slightly larger than the screen and has two USB ports. It is powered by an AC adapter. In 2018, Nintendo shared usage statistics about the Switch: about 50 percent of users play both in the docked and handheld mode, fewer than 20 percent use the console mainly in its docked mode (meaning over 80 percent of the total playing time), and around 30 percent use the Switch mostly in the handheld mode.

As for the games, the console marks a return to cartridges, also named "game cards." The internal storage comprises 32 GB and can be increased when inserting microSDHC or microSDXC memory cards. Games can also be played digitally when bought and downloaded through the eShop, Nintendo's online store for the Switch. Users access the eShop on the main interface of the console, which also shows games recently played as well as apps, news, and announcements and an album of screenshots taken in-game. This simple interface and the sleep mode were designed to allow players to quickly jump into games. As for multiplayer mode, up to eight people can play with two to eight consoles using an ad-hoc local network through Wi-Fi. Online play is also available through Wi-Fi or with a LAN adapter connected to the dock. Even though online play was free for several months, Nintendo launched its online service in 2018, priced at $20 for a one-year subscription. The subscription gives access to online play and a limited selection of NES games.

The Switch has a wide variety of games, a stark contrast with the Wii U. What is more, many games released or initially planned for the Wii U were ported and updated for the Switch. These games include *The Legend of Zelda: Breath of the Wild* (2017), which won the Game of the Year award in 2017 at the Game Awards, and *Mario Kart 8 Deluxe* (2017). Other notable first-party games exclusive to the Switch are *Super Mario Odyssey* (2017), *Nintendo Labo* (2018), *Pokémon Let's Go* (2018), and *Super Smash Bros. Ultimate* (2018). As for third-party games, *The Elder Scrolls 5: Skyrim* (2017), *Fortnite* (2018), *Diablo 3* (2018), and many more were released. The Switch has also been praised for its ever-growing library of indie games. The Nintendo Switch Lite was released on September 20, 2019.

Patrick Deslauriers

See also: Nintendo

Further Readings

Gilbert, B. "Nintendo Learned from 2 Huge Mistakes with the Wii U to Make the Switch a Runaway Success." *Business Insider*, October 9, 2017. Available at https://www.businessinsider.com/nintendo-switch-wii-u-failure-success-2017-10.

Sarkar, S. "Nintendo Switch Has 32 GB Storage, 720p Touchscreen (Update)." Polygon, January 13, 2017. Available at https://www.polygon.com/2017/1/13/14255984/nintendo-switch-hardware-specifications-screen-resolution.

Stuart, K. "RIP Wii U: Nintendo's Glorious, Quirky Failure." *The Guardian*, February 3, 2017. Available at https://www.theguardian.com/technology/2017/feb/03/rip-wii-u-nintendos-glorious-quirky-failure.

Nintendo 3DS. *See* Nintendo DS

Nintendo Virtual Boy

Hoping to cash in on the virtual reality (VR) craze in the late 1980s and early 1990s, Nintendo released the Virtual Boy. The Virtual Boy was a dual-monitor VR headset. The headset itself housed all the working components, such as the central processing unit (CPU), and sat atop a table on a bipod stand. To play, the user peered through the neoprene eyepiece and operated a well-designed six-buttoned, dual-directional control pad tethered from the headset.

Nintendo's 32-bit VR machine was originally referred to as the VR-32. After more than two years in development, it premiered at Nintendo's annual Shoshinkai software exhibit in Japan on November 15, 1994. It was released as the Virtual Boy in Japan the following July, followed by an August launch in the United States. The European release was pending but later canceled altogether because of failure of the unit in the Japanese and U.S. markets.

Longtime Nintendo employee Gunpei Yokoi designed the Virtual Boy. In earlier times, Yokoi's own research and development teams had developed the popular Game & Watch series for Nintendo as well as the unparalleled Nintendo Game Boy. As a result, Yokoi's contributions to the company played a large part in transforming Nintendo from a hanafuda playing card company into a toy company. This maneuver eventually led Nintendo into the video game industry.

The Virtual Boy's glasses were the first of their kind on the marketplace. The primary technology implemented in the system consisted of twin mirror-scanning light-emitting diode (LED) displays, used to create an impression of depth or a 3-D image. This technology was licensed from Reflection Technology, Inc., and it was the first time that Nintendo took an equity position in a U.S.-based privately held company.

The Virtual Boy's monochromatic game imagery was produced with red RTI LEDs, which were chosen over other colors because they consumed less energy, a power-saving maneuver to conserve battery life that was arguably one reason for the Game Boy's success over other handhelds in the previous generation.

The classification of the Virtual Boy is open to debate. Was it a portable gaming system or a home console? It was relatively lightweight compared with other home consoles, yet it was not very portable because it could not be played without being placed on a tripod stand that needed to be set on a hard surface, such as a table. It could be played with an AC adapter plugged into wall, but Nintendo went to great lengths to make sure that it had a solid seven-hour battery life. Nintendo did announce a shoulder mount adapter, to be sold separately, that would remove the necessity of a table and certainly make it more portable, but this adapter was never released.

The unit initially was priced at $180, with the game *Mario Clash* (1995) included. However, after very disappointing sales, Nintendo officially dropped the price to $160 after only being on the market for two months. Despite the new manufacturer's suggested retail price, many retailers reduced the unit even further to liquidate it from the shelves, some selling the game machine for as low as $16.

Many players complained that the unit gave them headaches, and Nintendo placed a warning on the product that it was not recommended for children under age seven. Furthermore, the unit itself informs players to take a break to rest their eyes after thirty minutes of playing time. This was certainly cause for alarm for some consumers and did nothing to improve units sold.

Although Nintendo had usually found success with its video game products, the Virtual Boy turned out to be a disaster. To date, it is the only Nintendo-released game platform considered to be a failure by both Nintendo and consumers alike, selling a relatively dismal 770,000 units.

As the industry leader, Nintendo was not prone to failure. When the system failed to excite the industry and received less than favorable reviews by the press, Nintendo insisted that Yokoi demonstrate the product himself at trade shows and other promotional events. This was not typically part of a supervisor's job and was intended to demean and insult the previously successful employee. As a result, and after decades of service, Yokoi left Nintendo. Soon after, working for Bandai, he designed the successful WonderSwan portable gaming unit before his untimely death as a result of a car collision.

Fourteen games were released for the Nintendo Virtual Boy in the United States before Nintendo ceased offering support for the system almost exactly a year after its debut in August 1996.

Michael Thomasson

See also: Nintendo

Nintendo v. Blockbuster Video

The court case of *Nintendo of America, Inc. v. Blockbuster LLC* is a lawsuit that was filed by Nintendo when it accused Blockbuster Video of violating copyright when it made copies of Nintendo's game manuals to rent out with Nintendo's video games. In the end, Nintendo lost the case, with the two companies settling out of court.

As Japanese copyright law features a rental right, or right of lending, which means that companies can refuse to let others rent their products, Nintendo did not let stores in Japan rent or copy its games. But while copyright law in the United States did cover music rentals, there was no such protection in the areas of videos and video games. The Computer Software Rental Amendments Act went into effect in 1990, but it only covered computer software and not home console video games.

Nintendo's response was to sue Blockbuster Video for copyright infringement for the copying of game manuals; the stores were making copies and sending them with copies of the games when they were rented. Blockbuster considered making its own manuals instead and ended up using a third party to create the manuals that would accompany the game rentals. Nintendo and Blockbuster finally settled out of court for an undisclosed amount. Afterward, both companies worked to repair their relationship and went on to further ventures together involving the renting of Nintendo's games. Nintendo even went so far as to release some games that were exclusive to Blockbuster stores, which are now collector's items due to their rarity.

In addition to paving the way for video game rentals in the United States, the court case revealed how copyright laws can differ from one country to another and from one medium to another as well as the legal distinction that is sometimes made between *computer software* and *video game software*, despite their both being made of computer code.

Mark J. P. Wolf

See also: Nintendo

Further Reading

"*Nintendo of America, Inc. vs. Blockbuster LLC.*" Wikipedia. Accessed September 25, 2020. Available at https://en.wikipedia.org/wiki/Nintendo_of_America,_Inc._vs._Blockbuster_LLC.

Perton, Brandon. "The Myth and Rarity behind Blockbuster Exclusive Video Games." The Old School Gaming Vault, April 11, 2018. Available at https://theoldschoolgamevault.com/blog/articles/1106-rare-blockbuster-video-games.

Rose, Tim, Jr. "5 Legal Battles That Changed Video Game History." Modern Rogue, June 14, 2018. Available at https://www.themodernrogue.com/articles/2018/6/13/5-legal-battles-that-changed-video-game-history.

Nintendo Wii

The Nintendo Wii is a seventh-generation console that was announced by Nintendo in 2004 and released in November 2006; it had sold more than 101 million units by the end of 2016. The Wii quickly moved into a dominant place in the console market, surpassing the Microsoft Xbox 360 and Sony PlayStation 3 in sales within a year of its release.

The console was originally only available in white, but it was made available in black at the end of 2009. The Wii uses a Bluetooth wireless controller called a Wii Remote that is motion sensitive and can be used as a pointer using infrared detection. The latter feature requires the attachment of an infrared sensor bar to the television screen. The Wii is packaged with an optional Nunchuk attachment to the Wii Remote that is also motion sensitive and is used in many Wii games. The Wii Remote and sensor bar were optimized by the 2009 add-on Wii Motion Plus that was also available bundled with *Wii Sports Resort* (2009). The Wii Remote came with an attachable wrist strap that Nintendo advised be worn around the players' wrists for safety reasons. Even so, numerous cases of injuries and damage to property were reported to have occurred during the course of playing Wii games, either due to overexertion or striking another object with or losing control of the Wii Remote.

The console's media drive could read Wii optical discs and Nintendo GameCube discs, but no other formats. The Wii is fully backward compatible with Nintendo GameCube software, although the online capabilities of that system are not supported; the games still require a Nintendo GameCube controller to work. The Wii connects wirelessly to the Nintendo DS, with several DS games utilizing this feature. This also allows console-specific content to be downloaded and stored on the Nintendo DS via the Wii. The Wii system has a hard drive with a 512 MB capacity and an SD card slot designed for external memory storage. Downloaded content can be stored in the internal hard drive or on SD cards. The Wii features free wireless and Ethernet connectivity and can be connected to other Wii systems for LAN play. The system has a parental lock that prevents children from viewing age-inappropriate content, and the rating of each game is encoded in the game's disc. Nintendo used the rating system set by the local regulations of each country where the games were released (e.g., in the United States, the Entertainment Software Ratings Board [ESRB] system was used). The system is also locked to a particular region and can only play discs of the same region.

The Wii system's interface is conceptualized as a series of television channels, with six channels appearing automatically: the Disc Channel (where the current game disc loaded into the Wii appears), the Mii Channel (where avatars are created), the Photo Channel, the Wii Shop Channel, the Forecast Channel, and the News Channel. Downloaded games appear as additional channels, and other channels—such as the Internet Channel—may also be purchased. Through the Wii Shop Channel, the Virtual Console and WiiWare services sell downloadable games. Virtual Console sells titles originally released on other consoles, primarily from Nintendo's own back catalog but also classic games from SEGA and other discontinued consoles, which were run through emulators. WiiWare sells original games that were often only available as downloadable content, such as the award-winning *World of Goo* (2008) and *Mega Man 9* (2008).

The Wii system was deliberately designed not to compete with other mainstream consoles (primarily the PlayStation 3 and Xbox 360); this was called the "blue ocean" strategy by Nintendo CEO Satoru Iwata. The strategy included targeting a broader audience that included people who were not generally considered gamers by having an interface, software, and advertising campaigns that appealed to the young, elderly, women, and casual gamers. The Wii was packaged with *Wii Sports* (2006). Nintendo (and Nintendo-owned subsidiaries) released several high-profile and critically acclaimed games from Nintendo's well-known franchises, including *The Legend of Zelda: Twilight Princess* (2006), *Mario Kart Wii* (2008), *Metroid Prime 3: Corruption* (2007), *New Super Mario Bros. Wii* (2009), *Super Mario Galaxy* (2007), *Super Paper Mario* (2007), and *WarioWare: Smooth Moves* (2007). Nintendo also released several popular games that broadened the Wii's audience. Fitness games, *Wii Fit* (2008) and *Wii Fit Plus* (2009), utilized the Wii Balance Board to calculate the user's body mass index (BMI). Each game included a large number of activities with the intention of providing players a core workout.

Although the Wii had substantial third-party support, with third-party developers working with key Nintendo licenses such as *Mario Party 8* (Hudson Soft, 2007) and *Super Smash Bros. Brawl* (Game Arts/Monolith/Sora, 2008), only a few third-party-designed Wii games sold as strongly as in-house games: *Game Party* (FarSight Studios, 2007), *Just Dance* (Ubisoft, 2009), and *Sports Island* (Hudson Soft 2008). This is attributed to the proliferation of poorly designed, low- to mid-priced games—"shovelware"—for the Wii, which allegedly caused games celebrated by critics, such as *A Boy and His Blob* (WayForward Technologies, 2009), *Little King's Story* (Cing/Town Factory, 2009), *MadWorld* (Platinum Games, 2009), and *Zack & Wiki: Quest for Barbaros' Treasure* (Capcom, 2007), to sell poorly. This was compounded by the family-friendly, casual orientation of the Wii, which meant that games aimed at adult audiences, such as *House of the Dead: Overkill* (Headstrong Games, 2009) and *Manhunt 2* (Rockstar Toronto, 2007), sold poorly.

Thomas H. Apperley

See also: Generations of Technology; Nintendo

Further Reading

Jones, S. *The Meaning of Videogames: Gaming and Textual Studies*. New York: Routledge, 2008.

Nansen, B. "Exertion Gaming as Kinaesthetic Technicity." *Second Nature* 1, no. 2 (2009): 64–91.

Nintendo Wii U

The Wii U is an eighth-generation console released by Nintendo in November

2012. The system had a distinctive and highly praised primary controller: the Wii U GamePad. The Wii U GamePad prominently featured a 15.7 cm embedded touchscreen, along with the more standard directional buttons, analog sticks, and action buttons.

Nintendo had been planning a new console since 2008 under various project titles that were eventually dubbed "Project Café." The remit of the new console was to make key technical improvements in the graphics and network infrastructure of the original Wii, which would enable Nintendo to effectively compete with the Sony PlayStation and Microsoft Xbox systems. The much anticipated Project Café was officially launched as the Wii U at the E3 2011 conference. In the following days, Nintendo's stock fell nearly 10 percent. Analysts believed that this drop in stock price reflected investors' possible concern that the Wii U GamePad was both less innovative than the original Wii Remote and would drive up the cost of producing the console.

The Nintendo Wii U console system, at E3 2011. (Antonio Jodice/Dreamstime.com)

The Wii U GamePad's touchscreen was designed for what Nintendo called "asymmetric gaming," which allowed for different gameplay objectives and experiences among players within multiplayer games. It could also be used in single-player games as a companion to games being played on a television or by playing games on the GamePad itself. The GamePad was connected to the Wii U wirelessly and supported near-field communication (NFC), which allowed the Nintendo Amiibo series to be activated by the GamePad as well as other Nintendo products, such as the trading cards from the 3DS game *Animal Crossing: Happy Home Designer* (2015).

The Amiibo series was launched in November 2014. It is based on a wireless communications and storage protocol that connects data stored on branded figurines to the Wii U, Nintendo 3DS, and Nintendo Switch. The Amiibo platform included both toys and trading cards, which used NFC to interact with supported software, allowing data to be transferred into and out of games and shared across multiple platforms. By the end of 2016, Nintendo had sold more than thirty-nine million Amiibo toys and more than thirty million Amiibo cards.

A conventional controller, called the Pro Controller, could also be purchased for the Wii U. The Pro Controller is an updated version of the Wii's Classic Controller that more closely resembles the controllers used by Microsoft and Sony consoles. The Wii U was compatible with existing Wii controllers, and up to four Wii Remotes could be used simultaneously, along with two Wii U GamePads.

The Wii U was originally released in two versions, with either 8 GB or 32 GB of storage. The latter "deluxe" or "premium" console also came with a Nintendo Network Premium subscription and was bundled with the game software *Nintendo Land* (2012).

Nintendo launched a service called Virtual Console in January 2013. The Virtual Console republished selected NES and Super NES titles that could be purchased and played on the Wii U or GamePad. In March 2014, selected Game Boy Advance titles were added, and from April 2015 onward, selected Nintendo 64 and Nintendo DS games were also available for download.

The Wii U further entrenched the dominance of Nintendo's classic game franchises on Nintendo consoles. Seven of the ten best-selling games were updates of franchises for the Wii U: *New Super Mario Bros. U* (2012), *Super Mario 3D World* (2013), *The Legend of Zelda: The Wind Waker HD* (2013), *New Super Luigi U* (2013), *Mario Kart 8* (2014), *Super Smash Bros. for Wii U* (2014), and *Mario Party 10* (2015). Each game sold over two million copies. Nintendo was also successful in expanding its software's dominance on the platform with the launch of newly conceived games, such as *Nintendo Land* (2012), *Splatoon* (2015), and *Super Mario Maker* (2015), which were also among the top-selling software for the console.

Online functionality for the Wii U centered around the Nintendo Network platform and the Miiverse, an integrated social networking service that allows users to share content in game-specific communities. The creation of Mii avatars remained an important part of the Wii U experience, and the Miiverse extended the functionality of the Mii into a social media–like environment. The Miiverse allowed users to share limited forms of communication, including in-game accomplishments, comments, and handwritten notes. Some game software added more functionality through the Miiverse; for example, *Super Mario Maker* allowed users to share comments and feedback on user-created levels.

The Wii U had low sales; just over thirteen million units were sold compared to over one hundred million for the Wii. The key innovation of the Wii U is the additional screen supplied by the GamePad that can be used as a supplement to the main display, or games can be played directly on the GamePad. The Nintendo Switch retained and refined this concept.

Thomas H. Apperley

See also: Nintendo; Nintendo Wii

Further Reading

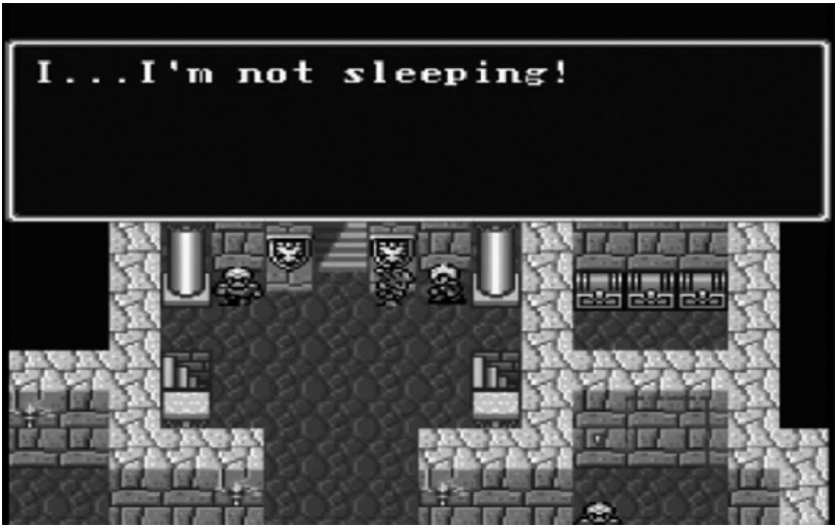
Nansen, B., Nicoll, B., and Tom Apperley. "Postdigitality in Children's Crossmedia Play: A Case Study of Nintendo's Amiibo figurines." In *Internet of Toys: Practices, Affordances and the Political Economy of Children's Smart Play*, edited by G. Mascheroni and D. Holloway, 89–108. Basingstoke, England: Palgrave MacMillan, 2019.

Stuart, Keith. "RIP Wii U: Nintendo's Glorious, Quirky Failure: Nintendo Has Ceased Production of Wii U Less Than Five Years after Its Launch. What Went Wrong, and What Will Be Its Legacy?" *The Guardian*, February 3, 2017. Available at https://www.theguardian.com/technology/2017/feb/03/rip-wii-u-nintendos-glorious-quirky-failure.

Non-Player Characters (NPCs)

A non-player character (NPC), or nonplayable character, is a character who is not controlled by the player in a video game. The term *non-player character* comes from the tabletop role-playing game (RPG) Dungeons & Dragons (1974), in which NPCs are created and controlled by the game master (GM). These characters are either friendly or unfriendly to the player characters, and a GM must prepare enough information about all NPCs to allow for both scenarios. Just as the GM in Dungeons & Dragons controls NPCs based on predetermined characteristics, NPCs in video games are generally controlled by the game's artificial intelligence (AI) system or, as in some massively multiplayer online role-playing games (MMORPGs), by game moderators.

Making NPCs believable to the player through both narration and gameplay is one goal of narrative games. David Freeman lists seven narrative strategies among his thirty-two "emotioneering" techniques, including "techniques which make major NPCs . . . dimensional and fresh, and thus interesting[,] . . . techniques which give major NPCs emotional depth and complexity . . . ways to make it feel as if major NPCs have an emotionally complex relationship with the player" and "ways to give the player emotionally complex relationships with major NPCs" (Freeman 2004). Petri Lankoski and Staffan Björk address five aspects of NPCs in *The Elder Scrolls IV: Oblivion* (2006) as they are experienced through gameplay: "human body; self-awareness, intentional states, and self impelled actions; expression of emotions; ability to use natural language; and persistent traits" (Lankoski and Björk 2007, 417). Believable NPCs who react to the player can help create a sense of "social presence" in the game world, particularly in single-player games (Nitsche 2008, 205–207). NPCs can function as information sources for players. Suellen Adams discusses the function of NPC "trainers" and "contacts" in *City of Heroes* (2004) as sources of both actively sought and passively received information (Adams 2009, 289).



I...I'm not sleeping!

In the prologue to *Final Fantasy IV* (1991), NPC lack of complexity is humorous, as multiple identical soldiers reply to the player with the same dialogue. (Courtesy of Mark J. P. Wolf)

Although narrative game design sometimes envisions NPCs as playing a similar narrative and identificatory role to characters in other media (print, film, etc.), video game theorists have argued that NPCs should also be studied on the basis of their behavior and functions. For example, Marsha Kinder argues (1991, 107) that the use of former NPC Princess Peach as a playable character in the North American release of *Super Mario Bros. 2* (1988) may lead boys to "risk . . . transgender identification" while playing, shifting the gender dynamics of the game and its players. James Newman argues that during online or participatory gameplay, both playable characters and NPCs are experienced less as narrative or visual elements than sets of capabilities and actions (Newman 2002).

The presence of NPCs may change the overall structure of a game. Jesper Juul sees NPCs in *EverQuest* (1999) as part of the "embedded progression structures" in a "game of emergence," describing how NPCs may ask the player to perform certain tasks, leading the player to engage in sequentially progressing "quests" within an otherwise open-ended game (Juul 2002, 328). In NPC-driven narratives, character locations may be marked on the game map so that the player knows where to go if he or she wants to continue that character's story.

REPETITIVENESS AND ADAPTABILITY

Because there are often many more NPCs than player characters, one aspect of NPCs is their repetitiveness. Different NPCs are often identical in appearance, and they may repeat the same actions and dialogue over and over again. In the single-player RPG *Final Fantasy IV* (1991), characters of the same type (soldiers, dancers, shopkeepers, healers) are all represented by the same avatar, with different clothing and hair colors. Moreover, not only do characters usually repeat the same comments every time the player talks to them, but some NPCs repeat the same dialogue. These limitations of early video game technology become a joke in the prologue to the game. As the player walks around a castle, several identical-looking soldiers seem startled when the player tries to talk to them, saying, "I'm not sleeping!"

Gail Shivel describes NPCs' repetitiveness as part of *World of Warcraft* (2004), writing, "A non-player character in Elwynn Forest will always ask you to carry a note to her lover if you have not already done so; a bounty on a gnoll named Hogger is collected a hundred times a day on every game server. . . . Every zone and every non-player character has a history—a backstory—and a desired outcome, which is repeated endlessly to every new player who comes along" (Shivel 2009, 211). Robert Yang criticizes this fungibility, arguing that open-world RPGs are often populated by NPCs with "generic identities" understood as "non-crucial actors who are infinitely replaceable by the game" (Yang 2017, 97–99).

Although the Digital Games Research Group at the University of Ulster in Northern Ireland suggests that the adaptation of NPCs over the course of a game is just one strategy for adaptive game design, calling the modification of NPCs "the most obvious way to adapt a game" (Digital Games Research Group 2005, 8), many scholars have proposed artificial intelligence (AI) models to increase NPC adaptiveness in games. In response to NPC repetitiveness in persistent MMORPG game worlds, Kathryn Merrick and Mary Lou Maher suggest the use of motivated reinforcement learning agents, through which NPCs "explore their environment and learn new behaviors in response to interesting experiences" (Merrick and Maher 2007, 127). Brian MacNamee and Pádraig Cunningham propose programming strategies for "Proactive Persistent NPCs[,] . . . NPCs that are always modeled (at least to some extent) even when the human player is not in their vicinity" (MacNamee and Cunningham 2001, 221).

Daniel Johnson and Janet Wiles discuss the advantages and disadvantages of several different AI systems for the behavior of NPCs, including neural networks and evolutionary algorithms, both of which are models for adaptive AI, and extensible AI, first used in *Quake* (1996), in which the player can control how NPCs react to enemies (Johnson and Wiles 2001). In Bioware's *Dragon Age: Origins* (2009), NPCs can be programmed by the player with Combat Tactics, conditional scripts for character behavior that allowed party members to fight autonomously and in real time. The entire game can be played controlling only the Warden, maintaining all other characters' statuses as NPCs.

BECOMING PLAYABLE CHARACTERS

In many single-player RPGs, characters that the player first encounters as NPCs later enter the player's party, becoming playable characters. In *Final Fantasy VI* (1994), the mercenary Shadow repeatedly enters and leaves the player's party, acting as both a playable character and an NPC. In the third-person shooter *Resident Evil 4* (2005), Ashley Graham, an NPC the player is trying to rescue through most of the narrative, briefly becomes a playable character.

NPCs that are popular with players may go on to become playable characters in future additions to a game franchise. Nintendo has built an extensive cast of playable characters from NPCs in the Mario franchise, allowing for a multiplayer racing game (*Super Mario Kart* [1992]), a fighting game (*Super Smash Bros.* [1999]), a sports game (*Mario Tennis*[2000]), and even a board game (Mario Party [1998]) incarnations of the series.

NPCs may also become playable characters through expansion packs that coexist in a single game world. Capcom's first expanded version of *Street Fighter II* (1991), *Street Fighter II: Champion Edition* (1992), was virtually identical to *Street Fighter II—The World Warrior* (1991), aside from the addition of the four NPC "bosses" from the earlier game as playable characters. *Grand Theft Auto IV: The Lost and the Damned* (2009) is an episodic expansion pack that centers on the NPC biker gang the Lost from the original *Grand Theft Auto IV*, making their leader, Johnny Klebitz, the new playable character. Playable characters in one iteration of a series may become NPCs in later installments as well, such as when Leliana and Morrigan from *Dragon Age: Origins* become NPC advisers in *Dragon Age: Inquisition* (2014).

In *The Sims* (2000), almost any NPC can become a playable character and vice versa. The player controls only one character at a time while the computer controls other characters, and players can shift player characters within their household at any time or select other households from the neighborhood map. Even maids, firemen, and burglars, who often look identical and do not have houses on the neighborhood map, can become part of the player's family through friendship or marriage, becoming playable characters. One notable exception in the *Sims* franchise is the Grim Reaper, who cannot be dated or married and for the most part cannot join the player's family. The Tombstone of Life and Death cheat in *The Sims 2* (2004) allows a sim to become pregnant by the Grim Reaper, though adding him to a household may permanently corrupt the game.

VALUES AND NPC INTERACTION

Rules for interaction with NPCs conspicuously communicate a game's values (Flanagan and Nissenbaum 2014, 48). Some shooting games, such as Atari's *Area 51* (1995), punish the player with the loss of life or other points for shooting nonenemy NPCs. In Nintendo's *The Legend of Zelda* franchise, if a player attacks harmless chickens too many times in a row, a swarm of chickens appears and begins attacking the player. Rockstar's *Grand Theft Auto* franchise allows players to collect money by killing innocent NPCs; however, if there are police in the area, they will begin chasing the player. Some games reward gendered violence against NPCs, as in the "Dastardly" achievement in Rockstar Games' *Red Dead Redemption* (2010) and the "Gender Wars" power-up for the dark-skinned character Purna, who is framed in Techland's game *Dead Island* (2011) as "man-hating" (Yang 2017, 100–106).

NPC interactions may help players think through ethical decision making, as in *BioShock* (2007), which presents the player the choice of whether to rescue or "harvest" the childlike Little Sisters in Rapture. The plot of *Undertale* (2015) also hinges on the player's choice to kill or spare NPCs, with its "pacifist" and “genocide” routes shifting the player’s relationship to all NPCs in the game. LV and EXP, stats earned for killing NPCs in many RPGs, are termed Level of Violence and Execution Points in *Undertale*’s game world.

Nicholas Ware argues that the iterative quality of romance and dating mechanics in games produces “video games’ Nice Guy Syndrome” (Ware 2015, 225). In playable (not scripted) romance and sex scenes with NPCs, players are encouraged to learn an NPC’s preferences and cater to it to win affection, with sex as a “reward” for correct choices (Ware 2015, 227). In farming simulator games such as the *Harvest Moon/Story of Seasons* series and *Stardew Valley* (2016), giving appropriate gifts is the primary mode of interaction with NPCs as well as the primary dating mechanic.

Games in the dating simulator or visual novel genre may engage in metacommentary on the player’s dates with NPCs: *Dream Daddy: A Dad Dating Simulator* (2017) gives letter grades to each date in colorful intertitles. Successfully dating all NPCs in a game may reveal new narrative information, as in PigeoNation’s *Hatoful Boyfriend: A School of Hope and White Wings* (2011). NPCs in visual novels may also break the fourth wall, showing their awareness of the game’s own dating mechanics, as in Cheritz’s *Mystic Messenger* (2016) and Team Salvato’s *Doki Doki Literature Club* (2017). These characters’ self-awareness challenges the player’s feeling of control in NPC dating situations and shows the developers’ understanding of the limitations of romance between players and NPCs.

Teddy Pozo

See also: Artificial Intelligence

Further Reading

Adams, Suellen S. “What Games Have to Offer: Information Behavior and Meaning-Making in Virtual Play Spaces.” *Library Trends* 57, no. 4 (Spring 2009): 676–693.

Digital Games Research Group. “Player-Centered Game Design: Player Modeling and Adaptive Digital Games.” In *Proceedings of DiGRA 2005 Conference: Changing Views—Worlds in Play*, 2005. Available at http://mural.maynoothuniversity.ie/12737/.

Flanagan, Mary, and Helen Nissenbaum. *Values at Play in Digital Games*. Cambridge, MA: MIT Press, 2014.

Freeman, David. “Creating Emotion in Games: The Craft and Art of Emotioneering.” *ACM Computers in Entertainment* 2, no. 3 (July 2004): 8–9.

Johnson, Daniel, and Janet Wiles. “Computer Games with Intelligence.” In *2001 IEEE Fuzzy Systems Conference*, 1355–1358. 2001.

Juul, Jesper. “The Open and the Closed: Games of Emergence and Games of Progression.” In *Proceedings of Computer Games and Digital Cultures Conference*, edited by Frans Mäyrä, 323–329. Tampere, Finland: Tampere University Press, 2002.

Kinder, Marsha. *Playing with Power in Movies, Television and Video Games: From Muppet Babies to Teenage Mutant Ninja Turtles*. Berkeley: University of California

Press, 1991.

Lankoski, Petri, and Steffan Björk. "Gameplay Design Patterns for Believable Non-Player Characters." In *Situated Play, Proceedings of DiGRA 2007 Conference*. 2007. Available at http://www.digra.org/digital-library/publications/gameplay-design-patterns-for-believable-non-player-characters/.

MacNamee, Brian, and Pádraig Cunningham. "A Proposal for an Agent Architecture for Proactive Persistent Non-Player Characters." In *Proceedings of the 12th Irish Conference on AI and Cognitive Science*, edited by D. O'Donogue, 221–232. 2001.

Merrick, Kathryn, and Mary Lou Maher. "Motivated Reinforcement Learning for Non-Player Characters in Persistent Computer Game Worlds." In *Proceedings of the International Conference on Advances in Computer Entertainment Technology*, 127–134. 2007.

Newman, James. "The Myth of the Ergodic Videogame: Some Thoughts on Player-Character Relationships in Video Games." *Game Studies* 2, no. 1 (July 2002). Available at http://gamestudies.org/0102/newman/.

Nitsche, Michael. *Video Game Spaces: Image, Play, and Structure in 3D Game Worlds*. Cambridge, MA: MIT Press, 2008.

Shivel, Gail. "World of Warcraft: The Murloc Is the Message." *Simploke* 17, nos. 1–2 (2009): 205–213.

Ware, Nicholas. "Iterative Romance and Button-Mashing Sex: Gameplay Design and Video Games' Nice Guy Syndrome." In *Rated M for Mature: Sex and Sexuality in Video Games*, edited by Matthew Wysocki and Evan W. Lauteria, 225–239. New York: Bloomsbury, 2015.

Yang, Robert. "On 'FeministWhorePurna' and the Ludo-Material Politics of Gendered Damage Power-Ups in Open-World RPG Video Games." In *Queer Game Studies*, edited by Bonnie Ruberg and Adrienne Shaw, 97–108. Minneapolis: University of Minnesota Press, 2017.

North America. *See* Canada; Mexico; United States of America

Norway

Norway is a country of about five million inhabitants, and it is known for its high penetration and early adoption of technologies. Around 35 percent of Norwegian citizens play video games on a daily basis, and for children between ages nine and eighteen, 77 percent of the boys and 47 percent of the girls report playing games on a computer, game console, smartphone, or tablet daily.

Although Norway was an early adapter of the new computing technology for research purposes in the 1950s, professional game development emerged late in Norway. As home computers were domesticized in the late 1970s and 1980s, the Commodore 64 and Amiga 500 were particularly popular in Norway. These technologies were important for why Norway had a vibrant demoscene culture in the 1980s and 1990s. The demoscene was a subculture originating in the home computer culture related to the 1980s software piracy scene but which also developed into a creative art form of its own. Early experimentation with game development took place in the demoscene, and while most of it remained a hobbyist endeavor, there are examples of game projects that eventually were released, such as *Fuzzball* (1991), developed by Scangames Norway, a company that sprang out of the demoscene group Razor 1911.

The first attempts at creating businesses around game development can be traced to the early 1990s, although up until around 2010, game development in Norway centered around one international triple-A developer, Funcom, and a handful of smaller companies focused on serious games for a domestic market that ranged from advergames and children's games to training simulations for the petroleum industry. Funcom originated as a third-party developer of games for consoles such as the Super Nintendo Entertainment System (SNES), SEGA Genesis, and the Sony PlayStation, but it made an impact with the adventure game *The Longest Journey* (1999) based on its own IP. Later, it became known for specializing in massively multiplayer online role-playing games (MMORPGs) such as *Anarchy Online* (2001), *The Secret World* (2012), and *Age of Conan* (2008). Another example of a still operational Norwegian game company that emerged in the 1990s is Ravn Studio, which has focused on children's games based on Norwegian franchises, such as *Flåklypa Grand Prix* (2001–19), *City of Friends* (2011–14), and *Captain Sabertooth* (2011–16). They have also released games based on their own original IP, such as *Angel Adventure* (2008–16) and *Snakeball* (2007).

With the emergence of new distribution solutions, networked society, and smartphone technology, game development has come to be viewed as an attractive new industry for game enthusiasts, and since 2013, the Norwegian game industry has counted around one hundred small and medium-sized game development companies. Most Norwegian game companies are today independent of external ownership and constraining publisher agreements; they seek investor money and support from private and semiprivate funds. Some also develop games by contract, and having parallel activities to fund game development is not uncommon. Some of the most successful companies who have emerged in this period are Playfish, a game company that focused on games for Facebook and social networks and was acquired by Electronic Arts (EA) in 2013 for $400 million, and Dirtybit, an independent company with one hundred million downloads of their mobile franchise *Fun Run* (2012–18). Some companies have also emerged as former Funcom employees have branched out and started their own businesses. Megapop (*Trolls v. Vikings* [2014]) and Snowcastle Games (*Earthlock* [2018]) are examples of such companies. With its international hit *Wordfeud* (2010) for smartphones, Bertheussen IT is also one of the most successful Norwegian game developers.

The emergence of a Norwegian game industry should be viewed in the context of the establishment of a public cultural policy for game development, reflecting traditional welfare state measures meant to positively influence the culture and media sector by protecting it against market forces and global mass culture. The introduction of a cultural support scheme for game development was initiated in 2003 as a response to the influx of violent video games from abroad and was proposed as a cultural policy that would secure children's access to nonviolent video games with Norwegian language and content. The initiative was followed up by the world's first white paper on video games in 2008. The white paper stressed the cultural importance of securing children's access to diverse, high-quality audiovisual content in the Norwegian language, but it also emphasized the importance of establishing trade measures to strengthen the game industry by creating jobs and fostering a higher innovation rate.

As of 2019, Norway's dedicated funding scheme for game development is administered by the Norwegian Film Institute (NFI), which historically has been the state agency for film funds. Game developers can apply for support for 75 percent of the production costs or 50 percent of the costs for marketing/launch of games that foster Norwegian cultural heritage, and there are also options for travel grants and manuscript development grants. Apart from the cultural scheme, Norwegian game developers have also benefited from support from general innovation grants. While the total amount that Norwegian game developers can receive through support schemes is not enough to cover the typical costs of a triple-A production, the cultural support and the focus on digital distribution and smartphones stresses a focus on small-scale productions on easily accessible platforms with a bias toward Norwegian cultural expressions.

Kristine Jørgensen

See also: Denmark; Finland; Sweden

Further Reading

Jørgensen, Kristine. "Newcomers in a Global Industry: Challenges of a Norwegian Game Company." *Games and Culture* (online) (August 2, 2017). Available at https://journals.sagepub.com/doi/full/10.1177/1555412017723265.

Jørgensen, Kristine, Ulf Sandqvist, and Olli Sotamaa. "From Hobbyists to Entrepreneurs: On the Formation of the Nordic Game Industry." *Convergence* 23, no. 5 (2015). Available at https://journals.sagepub.com/doi/full/10.1177/1354856515617853.

Ministry of Culture and Church Affairs. "Report No. 14 to the Storting (2007–2008) Video Games." 2008. Available at https://www.regjeringen.no/en/dokumenter/report-no.-14-to-the-storting-2007-2008/id502808/?ch1/41&q1/4.

Oslo Economics and Vasa Marketing. "Den norske spillbransjen. Utredning for Kulturdepartementet, 2018-3." Oslo Economics, 2018. Available at http://osloeconomics.no/publication/den-norske-spillbransjen/.

NPCs. *See* Non-Player Characters

O

Oculus Rift

Virtual reality (VR) technologies have been of interest for industrial and military purposes since the late 1960s, when Ivan Sutherland and his assistants developed "the Sword of Damocles" head-mounted display (HMD) at Harvard University (Sutherland 1968, 757). Gaming interests were much slower to develop, with the first gaming 3-D/VR head-mounted devices arriving two decades or more after the original HMDs. Devices such as Nintendo's Famicom 3D (1988) and Virtual Boy (1995), Virtuality Group's arcade games (early 1990s), and SEGA's arcade games (mid-1990s) opened up the promises of VR gaming for the consumer market but failed to gain large adoption due to the inability of the hardware to deliver on those promises (Bown et al. 2017, 249–251). These two periods of the initial HMD development and the first adaptations for gaming have been termed the first and second waves of VR, with the third wave beginning with the development of the Oculus devices (Henze and Kunze 2017, 14).

THE THIRD WAVE STARTS WITH OCULUS

In 2009, Palmer Luckey, an employee of the University of Southern California's Institute for Creative Technologies, developed an HMD using readily available electronics and optics. It used a powerful personal computer to produce the imagery for the device, which kept the cost of the HMD low, yet it delivered high-quality computer graphics available via sophisticated graphics cards. He decided to call his organization Oculus and the device "the Rift," as it "creates a rift between the real world and the virtual world, though I have to admit that it is pretty silly" (Luckey 2012a). In 2012, Luckey approached well-known game middleware developers Brendan Iribe, Michael Antonov, and others to lead the newly formed Oculus VR corporation in producing a consumer device.

Luckey shared his early prototype with other VR entrepreneurs, including John Carmack, founder of Id Software, the developer of many highly regarded games that pioneered consumer three-dimensional graphics. Carmack was impressed with the device and demonstrated a modified version at the Electronic Entertainment Expo in 2012. A year later, he joined Oculus VR as chief technology officer (CTO). Prior to this time, Oculus VR had mostly relied on crowdfunding for capital investment, but it began a round of funding under the leadership of the venture capital firm Andressen Horowitz, which led to a period of stable finances for the company.

In March 2013, the first developer kits shipped, although the initial plan was "to have the developer kits to all our backers before the [2012] holidays" (Luckey 2012b). These first DK1 devices were premiums for the Kickstarter campaign of 2012 for supporters contributing $300 or more. The DK2 was released in July 2014 to address several technical limitations of the original DK1, with the goal of producing a consumer version of the Rift by the first quarter of 2016.

The major event in the company's history also occurred in 2014: the social media giant Facebook purchased Oculus VR for $2.3 billion in cash and stock. The CEO of Facebook, Mark Zuckerberg, saw this acquisition as a path to the future for his company, writing, "Oculus has the chance to create the most social platform ever, and change the way we work, play and communicate" (Facebook 2014). Under the aegis of Facebook, Oculus has been able to expand through partnerships and acquisitions. In 2015, it partnered with Samsung to produce the Samsung Gear VR hardware and software, released on November 27, 2015. Acquisition of Surreal Vision in May 2015 bolstered the ability to 3-D map an environment in real time, and the purchase of the Eye Tribe in December 2016 improved the VR experience by making render quality depend on where the user looks. With these acquisitions, Oculus VR was more fully equipped to extend its devices into the areas of augmented and mixed realities that had emerged as more popular, and hence more profitable, than VR.

On May 21, 2014, ZeniMax Media, the parent of game developer Id Software, sued Luckey and Oculus VR for using its intellectual property without proper permission in developing the Oculus Rift product and sought financial damages for contract breach, copyright infringement, and unfair competition. John Carmack and Brendan Iribe were later added to the lawsuit. The jury trial ended on February 2, 2017, with the verdict that Luckey had violated the nondisclosure agreement (NDA) he had signed with ZeniMax in 2012. The jury awarded $500 million to ZeniMax (Orland 2017). Significantly, the jury found that none of the defendants (Oculus, Facebook, Luckey, Iribe, and Carmack) misappropriated or stole trade secrets. Oculus VR was ordered to pay $200 million for breaking the NDA and an additional $50 million for copyright infringement. Beyond this, Oculus VR and Luckey were ordered to pay $50 million each, and Iribe's portion was $150 million. As a result of subsequent appeals, a new judge cut the jury award to $250 million (plus interest of $54 million). In December 2018, ZeniMax and Facebook/Oculus VR settled the lawsuit for an undisclosed amount (Stampler 2018).

In tandem with the development of the devices, Oculus began promoting content creation for the device, starting Oculus Studios in 2014 to help third-party studios create games and experiences for the Oculus Rift. As part of this push, they began Oculus Story Studio (OSS), a VR animation studio, naming Saschka Unseld (formerly of Pixar) as creative director (Zeitchik 2015). OSS screened three VR films at the Sundance Film Festival: *Lost* (2015), *Henry* (2016), and *Dear Angelica* (2017). The production side of OSS was closed in May 2017, but the studio continues in existence to promote the three films it produced.

After staying with Oculus for two years after the Facebook acquisition, Palmer Luckey left the company in 2017 due to disagreements with Facebook management. Brendan Iribe also left Oculus in 2018—reportedly over differences with Facebook management concerning the direction that Oculus VR should pursue in the consumer market—to take "the first real break I've taken in over 20 years” (TechCrunch 2018). As of 2019, Carmack has remained CTO and continues to lead the development of new products for Oculus.

OCULUS VR PRODUCTS

Oculus produces several devices for the consumer market and has been at the forefront of the third wave of VR resurgence. The complete technical details for each product briefly discussed here are widely available, so only a concise overview of each device is included in this entry.

Original Prototype

The prototype used a side-by-side stereographic video stream using a 5.6-inch VGA display with a native resolution of 1280-by-800, which meant approximately 640-by-400 for each side. The body was made from laser-cut sheets of plastic that slid together and were secured with small bolts. The display module was meant to be detachable from the optics module to modify, replace, or upgrade the lenses. A version of this was shown at E3 in 2012.

DK1

Oculus chose a 1280-by-800 resolution 7-inch display for the first developer kit, which weighed thirty grams more than the 5.6-inch display of the original prototype. This display beat the prototype in almost every key area, including response time, switching time, contrast, and color quality. The improved switching time of the panel alleviated most of the motion blur in the original prototype. Oculus also developed its own 9DOF motion sensor to improve performance in VR-critical areas. It supported a refresh rate of up to 1000 Hz, several times faster than the previous sensor. In addition to the accelerometer and gyroscope, it also included a magnetometer, improving sensor data collection and head tracking. Data coming from the new sensor could be accessed using the Oculus SDK (in easy to manipulate formats such as quaternion, matrix, and Euler angles) or directly as raw sensor data. This version shipped in March 2013 as a premium for those who contributed $300 (for an assembled kit) or $275 (for an unassembled one) (Oculus 2012).

DK2

The DK2 made several improvements over the DK1, including a higher-resolution 1920-by-1080 OLED display (adapted from a Samsung Galaxy Note 3 smartphone display). It also has a higher refresh rate than the DK1, better positional tracking, and a cable that separates from the HMD, and it no longer needs the external control box. Oculus started shipping the DK2 in July 2014.

Samsung Gear VR

In partnership with Samsung, Oculus helped develop the Gear VR, an HMD that used a Samsung smartphone both as the display and the processing unit for the content. It was released on November 27, 2015.

Consumer Version 1 (CV1)

The Consumer Version of the Rift is an improvement over the DK2. It features separate 1080p OLED displays (with a 90 Hz refresh rate) for each eye, 360-degree positional tracking using LEDs in the back of the headset, integrated audio, positional tracking volume, a lower weight, and renewed attention to consumer ergonomics and aesthetics. Positional tracking is accomplished using a sensor system placed within the tracking area that has optical sensors that detect the IR LED markers on the tracked devices (such as the HMD and hand controllers). A business version of the CV1 was announced in June 2017. Oculus originally planned on shipping these in March 2016, but due to a parts shortage, they finally shipped in July 2016. This model is scheduled to cease production sometime in the next year.

Oculus Go

The Go is a stand-alone VR HMD device that involved the cooperation of the mobile chip developer Qualcomm and the Chinese smartphone manufacturer Xiaomi to bring to the market. The device uses Qualcomm's Snapdragon 821 processor instead of a personal computer for processing gameplay. The display is a 5.5-inch LCD with a resolution of 2560-by-1440 (1280-by-1440 per eye) and uses the same Fresnel lenses found in the original Rift. Unlike the Rift, it has just three degrees of freedom in its tracking area, but it includes a small hand controller for VR interactions. Two audio speakers provide spatial surround sound, but the device also includes a 3.5 mm jack for user-provided headphones. Accessories include prescription lenses for insertion into the device. Two storage configurations are available, with 32 GB of internal storage ($199) or 64 GB of internal storage ($249).

Oculus Rift S

The Oculus Rift S breaks little new ground vis-à-vis the CV1 model and even backtracks somewhat. Changes include a slower refresh rate (80 Hz) for the single 2560-by-1440 LCD display (which cannot display the deep blacks of the original Rift's OLED displays). Because of these substitutions (which are not necessarily improvements to the device), Oculus calls it *Rift S* and not *Rift 2*. A different approach to tracking uses five cameras onboard the headset: two on the front, one each on the left and right sides, and one looking directly upward. The cameras can be fed directly to the display so that a user may move in the real world without removing the Rift S, which Oculus terms *Passthrough*+. The original Rift's headphones have been replaced by a pair of speakers integrated into the headband, two inches above the user's ears, which is a step backward from the CV1 Rift. In partnership with Lenovo, the Chinese PC manufacturer, Oculus reconfigured the ergonomics of the head straps in a similar fashion to a PlayStation VR HMD. The hand controllers have also been changed to meet the demands of the new onboard tracking cameras, with the ring now appearing on top of the controller rather than below. This new consumer Rift S model shipped May 21, 2019.

Oculus Quest

Originally dubbed the "Santa Cruz" when announced by Mark Zuckerberg in 2016 at Oculus Connect 3, the Quest is much like an uber version of the earlier Oculus Go; it is also a stand-alone VR HMD device, but it uses a more powerful Qualcomm Snapdragon 835 mobile chip for processing might. It also has two diamond Pentile OLED displays, one for each eye, with individual resolutions of 1440-by-1600 and a refresh rates of 72 Hz. It keeps the same lens technology from the Go, which helps to minimize visual artifacts such as god-rays, and, unusually for Oculus, it also features a physical interpupillary distance adjustment. Like the Rift S, the Quest also shipped on May 21, 2019.

TRACKING HARDWARE AND TOUCH CONTROLLERS

The first sensor system that enabled the tracking of the HMD and hand controllers was named *Constellation* by Oculus VR. It has optical sensors that detect the IR LED markers on the tracked devices as they blink in specific patterns. Recognizing the configuration and pattern of the blinking LEDs on a device allows the system to determine its precise position with great precision and almost no latency. One or more USB infrared sensors (which can be mounted on walls or ceilings or set on stands) provide the system with depth information about the area. The Constellation system was dropped in the later Rift models for an onboard-the-HMD camera system, which solved some of the early tracking problems.

Early Oculus Rift units came with an Xbox One controller for convenience in navigating and interacting with the games available for the device. By mid-2016, Oculus had developed its own controllers for the Rift, called the *Oculus Touch*. The Touch consisted of two handheld units, each with an analog stick, three buttons, and two triggers (one for grab and the other for attack). The x, y, and z coordinates of the controllers are tracked in the area by the tracking system used by the particular Rift model being employed. The Touch was originally an accessory for the Rift, requiring a separate purchase, but finally, in August 2017, the Oculus Touch and a second tracking sensor were added to the standard Rift bundle.

GAMES FOR THE OCULUS HMDS

Palmer Luckey's reason for developing the Rift was almost exclusively to play games. Although the Facebook acquisition broadened that emphasis to include industrial, communication, and social foci, by and large, most of the usage for an Oculus device is to play games. Over the course of time, several games have emerged that have played an important role in the history of the Rift. The short exploration that follows covers some of them.

DOOM BFG

This game was the original demo by John Carmack at E3 in 2012. It was supposed to have been bundled with the DK1 when it shipped, but it was not ready yet and was never subsequently released for Oculus. However, an Oculus port of *DOOM 3* (2004) exists.

EVE Valkyrie

CPP games created *EVE Valkyrie* in 2015 based on its massive multiplayer online game (MMO) *EVE Online* (2003). It was bundled with the consumer version of the Rift in 2016. At the time, Palmer Luckey said,

> *EVE: Valkyrie* is one of the most anticipated virtual reality games, and one of the first true VR games to go into development. It perfectly captures the promise of immersive gaming, shooting you into a sci-fi adventure as you pilot a spaceship in search of combat. Battling your friends (and enemies) in multiplayer space dogfights is the ultimate VR thrill, and we're excited to partner with CCP to bring this experience to Rift owners everywhere. (Morrison 2015).

Beat Saber

Beat Saber, a popular game made for Oculus Rift devices, is typically included on lists of best Rift games and was an included launch title for the Oculus Quest in May 2019. The player slashes colored blocks while avoiding mines and walls, all of them approaching in 3-D space. *Beat Saber* became the highest-rated game on Steam less than a week after its release.

Moss

Polyarc Games released *Moss* to several VR platforms in 2018. It throws the player into a fantasy world of anthropomorphized animals working to defeat a villainous snake, mainly through solving puzzles. It is routinely rated as one of the best VR games.

The Elder Scrolls V: Skyrim VR

Bethesda's masterpiece role-playing game (RPG) was eventually released for Oculus Rift. *Skyrim VR* is the full *Skyrim* experience, explorable with even more immersion, and an excellent example of a port from a traditional gaming experience to a very high-quality VR one that tops the original.

John Reid Perkins-Buzo

See also: HTC Vive; Virtual Reality

Further Reading

Bown, Jonathan, Elisa White, and Akshya Boopalan. "Looking for the Ultimate Display: A Brief History of Virtual Reality." In *Boundaries of Self and Reality Online*, edited by Jayne Gackenbach and Jonathan Bown, 239–259. Cambridge, MA: Academic Press, 2017.

Crecente, Brian. "Oculus Rift S, Oculus Quest Hit May 21, Pre-Orders Open." *Variety*, April 30, 2019. Available at https://variety.com/2019/gaming/news/oculus-rift-s-oculus-quest-release-date-1203200289/.

Facebook. "Facebook to Acquire Oculus." Press Release, March 25, 2014. Available at https://newsroom.fb.com/news/2014/03/facebook-to-acquire-oculus/.

Feltham, Jamie. "John Carmack Used Beat Saber to Refine Oculus Quest Tracking." UpLoadVR, March 18, 2019. Available at https://uploadvr.com/john-carmack-beat-saber-quest/.

Henze, Niels, and Kai Kunze. "A Dagstuhl Seminar Looks beyond Virtual and Augmented Reality." *IEEE Multimedia* 24, no. 2 (April–June 2017): 14–17. Available at https://ieeexplore.ieee.org/document/7924255.

Luckey, Palmer. "'Oculus 'Rift': An Open-Source HMD for Kickstarter." Meant to Be Seen, April 15, 2012a. Available at https://www.mtbs3d.com/phpbb/viewtopic.php?f = 140&t = 14777.

Luckey, Palmer. "Update on Developer Kit Technology, Shipping Details." Oculus VR, November 28, 2012b. Available at http://www.oculusvr.com/blog/update-on-developer-kit-technology-shipping-details.

Matney, Lucas. "Oculus Co-Founder Is Leaving Facebook after Cancellation of 'Rift 2' Headset." TechCrunch, October 22, 2018. Available at https://techcrunch.com/2018/10/22/oculus-co-founder-is-leaving-facebook-after-cancellation-of-rift-2-headset/.

Morrison, Angus. "EVE: Valkyrie to Come with Every Oculus Rift Pre-Order." *PC Gamer*, December 10, 2015. Available at https://www.pcgamer.com/eve-valkyrie-to-come-with-every-oculus-rift/.

Oculus. "Oculus Rift: Step into the Game." Kickstarter, August 1, 2012. Available at https://www.kickstarter.com/projects/1523379957/oculus-rift-step-into-the-game/updates.

Orland, Kyle. "Oculus, Execs Liable for $500 million in ZeniMax VR Trial." Ars Technica, February 1, 2017. Available at https://arstechnica.com/gaming/2017/02/oculus-execs-liable-for-500-million-in-zenimax-vr-trial/.

Stampler, Laura. "Facebook and ZeniMax Settle Lawsuit over Alleged Theft of Virtual Reality Technology." *Fortune*, December 12, 2018. Available at http://fortune.com/2018/12/12/facebook-zenimax-settle-lawsuit-virtual-reality/.

Sutherland, Ivan E. "A Head-Mounted Three Dimensional Display." In *Proceedings of AFIPS '68*, 757–764. New York: Association for Computing Machinery, 1968.

Zeitchik, Steven. "Sundance 2015: Virtual-Reality company Oculus to Launch Film Label." *Los Angeles Times*, January 26, 2015. Available at https://www.latimes.com/entertainment/movies/moviesnow/la-et-mn-sundance-2015-oculus-vr-films-headset-20150126-story.html.

Odyssey. *See* Magnavox Odyssey

Online Games

As the term *online* refers to the phone- and data-line connections through which networked computers communicate, *online games* refers to those video games that can be found and played on networked computers or computing devices and on the internet, including its graphical interface, the World Wide Web. Used even more loosely, the term *online games* could apply to games on cell phones and other forms of mobile games that also use telephone technology and connectivity to link players and games. Online games are typically multiplayer games because the reason for being online is usually to allow multiple players at different locations to play together in the same game or game world.

The earliest games to appear "online" were the mainframe games that were accessed remotely from computer terminals during the 1970s. These were typically only available on college campuses and in research laboratories and allowed only a small number of players. As microcomputer technology grew and home computers helped to decentralize computing power, ways of connecting personal computers via telephone lines and modems resulted in the rise of bulletin board systems (BBSs) and networked games, some of which contained games that players could log into and play, although generally no more than about sixteen players could play simultaneously, as in, for example, *Scepter of Goth* (1983). These developed around the same time as multiuser domains (MUDs), and both types of online activities grew throughout the 1980s and helped to shape the massively multiplayer online role-playing games (MMORPGs) that would develop in the mid-1990s.

Home video game console systems first extended to the online world with the release of Mattel's PlayCable service in 1981 and, two years later, the CVC Gameline, a device that plugged into the cartridge bay on the Atari VCS 2600 and a phone jack that allowed games to be downloaded and played but required a subscription to the service. The games, however, were not played online, and it would not be until the release of the SEGA Dreamcast in 1998 in Japan (1999 in North America) that a home console came equipped with a built-in modem that allowed for internet capabilities.

Since the appearance of the World Wide Web in 1993, web-based games have grown in number and popularity, both on personal computers as well as other devices, such as cell phones, iPods, and iPads used for mobile gaming. The ability to play games online has also led to the production of advergames, which are used to advertise products in a way that engages the user, and games designed for use with social media, such as *FarmVille* (2009) and *Mafia Wars* (2009). With the growth of cloud computing, an increasing number of games can be leased online instead of purchased. As digital distribution and downloadable content (DLC) and the bandwidth of home internet connections continue to expand, with all major home consoles and computers featuring a built-in online connection, online games could now arguably be considered the dominant form of gaming.

Mark J. P. Wolf

See also: Bulletin Board Systems; CVC Gameline Master Module; Multiuser Domains; Social Media

Further Reading

MacCallum-Stewart, Esther. *Online Games, Social Narratives*. New York and London: Routledge, 2014.

Mulligan, Jessica, Bridgette Patrovsky, and Raph Koster. *Developing Online Games: An Insider's Guide*. Upper Saddle River, NJ: Pearson Education, 2003.

Taylor, T. L. *Play between Worlds: Exploring Online Game Culture*. Cambridge, MA: MIT Press, 2006.

Ontology

The most common understanding of *ontology* in philosophy is that it is a study of "what there is"—a map of all existing entities (Hofweber 2018). Ontology does not typically end with a sheer inventory of entities but tries to group them into types by describing their general features as well as the relations between them. This often results in conceptual frameworks, typologies, and hierarchies. *Game ontology* can be understood simply as ontology narrowed down to one specific domain—games. Thus, instead of asking about everything that exists, game researchers ask questions about all existing games, their most general features, and the relations between them. In this sense, *game ontology* can be likened to how *ontology* is typically understood in computer science, where it refers to the ontology of very specific local domains, such as object types discerned in particular programming languages or operating systems.

Similarly to general ontology, game ontology is very often closely connected to language. There are three reasons for this. First, the discovery of the general features of games is often conducted via conceptual analysis, that is, the study of meanings and usage of words. Second, conceptual frameworks created by game ontologists can be treated as new languages for game description (Zagal et al. 2007). Third, ontological analyses can serve as a basis of new definitions of key concepts such as *game*, *mechanics*, and *immersion*.

Apart from being an autonomous discipline, game ontology can also be used to detect ontological assumptions of existing game research and show how these assumptions codetermine the author's claims. In addition to that, it is very common for papers belonging to other subfields of game studies to contain an ontological section in which the authors adhere to general fundamental properties of studied phenomena to better define the subject of their research.

FOUR TYPES OF GAME ONTOLOGY

Researchers who study general features of games may look at their subject from at least four perspectives that differ in scope.

First, they may be asking *external* questions and wonder how games and their elements should be located on the general ontological map—how they relate to other types of objects. For example, they may ask whether games should be treated as fictional (Tavinor 2017), virtual (Aarseth 2007; Chalmers 2017), or possible objects (Van Looy 2005) or investigate how games relate to other media (Ziegfeld 1989; Ecenbarger 2016). They may try to locate games within existing ontological categories (such as objects or processes [Aarseth 2014]) or postulate completely new general ontological categories suitable for the description of games, such as "unit operations" (Bogost 2008).

Second, game ontologists may employ a more *internal* perspective—focusing exclusively on games and trying to describe their most salient properties and parts. This study could result in a suggestion of a new definition of *games* (Arjoranta 2014; Stenros 2017), a description of their common internal structure (e.g., a division between their ludic and narrative side [Juul 2005], or the establishment of a general typology of games [Caillois 1958; Carter et al. 2012]).

Third, researchers can focus on a given subset of games and try to establish its unique identity. One popular example of this approach is the study of particular game genres (Karhulahti 2011), but the grouping of games does not have to conform to typical genre divisions (Chiapello 2013; Garda and Grabarczyk 2016).

Last but not least, game ontology can sometimes concentrate on particular properties or parts of games and try to describe them in a general manner or supply a framework for their categorization. Some of these aspects have their counterparts in the considerations from general ontology. Discussions on space (Fernández-Vara et al. 2005) and time (Zagal and Mateas 2007), the status of rules (Juul 2005; DeLeon 2013), agency (Nguyen 2019), or emergence (Juul 2002) can serve as examples. In other cases, game scholars focus on aspects unique to games, such as mechanics (Sicart 2008), immersion (Calleja 2011), quests (Aarseth 2005), or avatars (Klevjer 2006).

Focusing on game elements does not keep the resulting frameworks from being comprehensive. Two good examples of such bottom-up overarching projects are the Game Ontology Project (https://www.gameontology.com/index.php/Main_Page) and the Historical-Analytical Comparative System (HACS) (Therrien 2017). In both cases, the sheer number of recognized and categorized game elements enables their authors to develop frameworks that are universal enough to describe most existing games. Description and categorization of game elements bring game ontology close to some of the approaches to game design that may contain their own ontological descriptions.

META-ONTOLOGY: HOW IS GAME ONTOLOGY EVEN POSSIBLE?

On the face of it, developing ontology for the domain of games may seem like a futile task. Games are artifacts (as opposed to natural kinds), which means that finding stable patterns in their structure or their essential properties may not be possible. The set of *all games* may be simply too heterogenous, as that depends only on the whim of the creators and the players. How can researchers create sustainable categorizations or definitions if the subject of their theories can evolve at any time without any constraints? What is the use of a definition if developers can render it obsolete by creating a game designed specifically to challenge it?

The answer to these questions belongs to *meta-ontology*, that is, to the study of methods and aims of ontology (meta-ontology is typically treated as a part of ontology in the widest sense [Hofweber 2018]). There are at least three strategies that game ontologists could employ to solve this problem.

First, game ontologists could focus only on the formal, structural aspects of games (independent from the intentions of the creators and the interpretation of the users) and map the whole possibility space that these formal properties allow (Aarseth et al. 2003). This results in a fairly foolproof analysis because it gives the researcher a chance to transcend the existing sample of games and talk about any combination of discerned properties (ideally, all possible games).

Second, instead of studying games, researchers may shift their attention to the existing processes of human classification. Instead of discovering what a game or a given genre is, they may try to discover what it is considered to be in a given community. This question can be answered via conceptual analysis or empirical methods, for example, by analysis of the corpus of game descriptions created by the users (Ryan et al. 2015) or journalists (Therrien 2017).

Third, a game ontologist could employ a fully pragmatic attitude. According to this standpoint, game ontology frameworks are simply formal tools that facilitate understanding of games by abstracting away some of their properties. They are models of our game descriptions. Their usefulness is always tied to a task at hand; they may be enough for a given research project, but they do not pretend to capture universal regularities applicable in every case (Aarseth and Grabarczyk 2018). In this sense, the task of the ontologist is similar to the task of a logician creating formal representations of parts of natural languages: it is always possible to represent language in several ways, and the choice between formalizations only depends on how useful they are in a given case.

Paweł Grabarczyk

See also: Games, Philosophical Critique of

Further Reading

Aarseth, Espen. “Doors and Perception: Fiction vs. Simulation in Games.” *Intermédialités: Histoire et théorie des arts, des lettres et des techniques* (*Intermediality: History and Theory of the Arts, Literature and Technologies*) 9 (2007): 35–44.

Aarseth, Espen. “From Hunt the Wumpus to EverQuest: Introduction to Quest Theory.” In *International Conference on Entertainment Computing*, 496–506. Berlin and Heidelberg, Germany: Springer, 2005.

Aarseth, Espen. “Ontology.” In *The Routledge Companion to Video Game Studies*, edited by Mark J. P. Wolf and Bernard Perron, 484–492. New York: Routledge, 2014.

Aarseth, Espen, and Paweł Grabarczyk. *An Ontological Meta-Model for Game Research*. DiGRA Conference, July 25–28, 2018, Turin, Italy. Available at https://www.semanticscholar.org/paper/An-Ontological-Meta-Model-for-Game-Research-Aarseth-Grabarczyk/dc495fe0a74717fc4393a8cf84efe1b109b4471d.

Aarseth, Espen, S. M. Smedstad, and L. Sunnanå. “A Multidimensional Typology of Games." DiGRA Conference, November 4–6, 2003, University of Utrecht, The Netherlands.

Arjoranta, J. "Game Definitions: A Wittgensteinian Approach." *Game Studies* 14, no. 1 (2014). Available at http://gamestudies.org/1401/articles/arjoranta.

Bogost, Ian. *Unit Operations: An Approach to Videogame Criticism*. Cambridge, MA: MIT Press, 2008.

Caillois, Roger. *Man, Play, and Games*. Chicago: University of Illinois Press, 1961 [1958].

Calleja, Gordon. *In-Game: From Immersion to Incorporation*. Cambridge, MA: MIT Press, 2011.

Carter, M., M. Gibbs, and M. Harrop. "Metagames, Paragames, and Orthogames: A New Vocabulary." In *Proceedings of the International Conference on the Foundations of Digital Games*, 11–17. New York: ACM, 2012.

Chalmers, D. "The Virtual and the Real." *Disputatio* 9, no. 46 (2017): 309–352.

Chiapello, L. "Formalizing Casual Games: A Study Based on Game Designers' Professional Knowledge." DiGRA Conference, Atlanta, GA, USA, August 26–29, 2013.

DeLeon, C. "Rules in Computer Games Compared to Rules in Traditional Games." DiGRA Conference, 2013.

Ecenbarger, C. "Comic Books, Video Games, and Transmedia Storytelling: A Case Study of *The Walking Dead*." In *International Journal of Gaming and Computer-Mediated Simulations* 8, no. 2 (April–June 2016). Available at https://dl.acm.org/doi/10.4018/IJGCMS.2016040103.

Fernández-Vara, C., J. Zagal, and M. Mateas. "Evolution of Spatial Configurations in Videogames." DiGRA Conference, 2005.

Garda, Maria B., and Paweł Grabarczyk. "Is Every Indie Game Independent? Towards the Concept of Independent Game." *Game Studies* 16, no. 1 (2016). Available at http://gamestudies.org/1601/articles/gardagrabarczyk.

Hofweber, T. "Logic and Ontology." In *The Stanford Encyclopedia of Philosophy (Summer 2018 Edition)*, edited by Edward N. Zalta. 2018. Available at https://plato.stanford.edu/archives/sum2018/entries/logic-ontology/.

Juul, Jesper. *Half-Real: Video Games between Real Rules and Fictional Worlds*. Cambridge, MA: MIT press, 2005.

Juul, Jesper. "The Open and the Closed: Games of Emergence and Games of Progression." In *Computer Games and Digital Cultures Conference Proceedings*. 2002.

Karhulahti, V. M. "Mechanic/Aesthetic Videogame Genres: Adventure and Adventure." In *Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments*, 71–74. New York: ACM, 2011.

Klevjer, Rune. *What Is the Avatar? Fiction and Embodiment in Avatar-Based Single-Player Computer Games*. Doctoral diss., University of Bergen, Norway, 2006.

Nguyen, C. T. "Games and the Art of Agency." *Philosophical Review* 128, no. 4 (2019): 423–462.

Ryan, J. O., E. Kaltman, A. M. Fisher, T. Hong, T. Owen-Milner, M. Mateas, N.

and Wardrip-Fruin. “Large-Scale Interactive Visualizations of Nearly 12,000 Digital Games.” In *Proceedings of the Foundations of Digital Games*. 2015. Available at https://www.semanticscholar.org/paper/Large-Scale-Interactive-Visualizations-of-Nearly-12-Ryan-Kaltman/b5f941295b6d42d4646a2c65d001b5cd76ab8c0e.

Sicart, M. “Defining Game Mechanics.” *Game Studies* 8, no. 2 (2008). Available at http://www.gamestudies.org/0802/articles/sicart.

Stenros J. “The Game Definition Game: A Review.” *Games and Culture* 12, no. 6 (2017): 1–22. https://doi.org/10.1177/1555412016655679.

Tavinor, G. “Fictionalism and Videogame Aggression.” DiGRA Conference, 2017.

Therrien, Carl. “From Video Games to Virtual Reality (and Back): Introducing HACS (Historical-Analytical Comparative System) for the Documentation of Experiential Configuration in Gaming History.” In *DiGRA ’17: Proceedings of the 2017 DiGRA International Conference*. 2017.

Van Looy, J. “Virtual Recentering: Computer Games and Possible Worlds Theory.” *Image and Narrative: Online Magazine of the Visual Narrative* no. 12 (2005). Available at http://www.imageandnarrative.be/inarchive/tulseluper/vanlooy.htm.

Zagal, José P., et al. “Towards an Ontological Language for Game Analysis.” *Worlds in Play: International Perspectives on Digital Games Research* 21 (2007): 21.

Zagal, José P., and Michael Mateas. “Temporal Frames: A Unifying Framework for the Analysis of Game Temporality.” In *Situated Play: Proceedings of the 2007 Digital Games Research Association Conference*, 516–523. Tokyo, Japan: University of Tokyo, 2007.

Ziegfeld, R. “Interactive Fiction: A New Literary Genre?” *New Literary History* 20, no. 2 (1989): 341–372.

Open-Source Software

The relationship between video games and open forms of content generation has always been intertwined due to the status of games as playful software systems. *Open-source software* is commonly defined as a mode of production where the source code is open to anyone for modification, regardless of their professional status. Through sharing, reusing, and modifying software in an open setting, new forms of collectively collaborative content altogether has emerged. As Steven Weber noted in 2002 (2), it is this openly collaborative environment that allows for “complex, sophisticated software systems outside the boundaries of a corporate structure and for no direct monetary compensation” to arise. For Weber, examples of open-source software included operating systems such as Linux and web browsers such as Apache (or later Firefox) that presented an alternative to the political economy of commercial media production. However, with the growth of the internet and its vast variety of participatory cultures, the openly collaborative ethos of open-source software has widened.

The “free-culture movement,” for example, is a social movement aimed at widening the open-source ethos to any creative work by removing copyright concerns (Lessig 2004, 2008). As an industry, video games have always been at the forefront of responding to movements such as free culture, as many games promote participatory activities, such as modding (Dovey and Kennedy 2006, 130). Indeed, many of the most popular game genres were pioneered by nonprofessional modders, many games inspire passionate participatory cultures, and every game is in some sense open due to its status as a played activity. For commercial game developers, promoting these openly co-creative relations is fundamental to the success of their game because participants can lower development costs through playtesting (or participating in early access; see Consalvo and Paul 2017), product life cycles can be extended (Kerr 2017, 93), and games can develop in altogether unpredictable ways. For example, scholars studying modding cultures have noted the way that modders exist in a different "moral economy" to commercial developers, and it allows them to create material not possible in commercial contexts. Mods, which are often illegal due to their precariously copyrighted material, such as a *Game of Thrones* mod in Paradox Development Studio's *Crusader Kings II* (2012) or a mod of Bioware's *Mass Effect* (2007) in Firaxis Games' *Civilization V* (2010), are nonetheless often implemented into the co-creative identity and ongoing economic value of digital games (Postigo 2008; Johnson 2009). Openly participatory activities, such as those of modders, exemplify the blurred boundaries "between play and production, between work and leisure, and between media consumption and media production" that many game studies scholars have noted (Pearce 2006, 18).

It is beyond the scope of this entry to consider the variety of open-source software present in games due to its sheer ubiquity. What is noteworthy, though, is the synergy between games and their status as an openly participatory and playful activity. As T. L. Taylor notes, the open structure of games poses important questions surrounding the ownership, governance, and ongoing control of a game's rules (Taylor 2007, 114).

Joshua Jarrett

See also: Game Modifications

Further Reading

Consalvo, Mia, and C. Paul. "'If You Are Feeling Bold, Ask for $3': Value Crafting and Indie Game Developers." In *Proceedings of DiGRA 2017 Conference*. 2017.

Dovey, J., and W. H. Kennedy. *Game Cultures: Computer Games as New Media*. Maidenhead, England: Open University Press, 2006.

Johnson, D. "StarCraft Fan Craft: Game Mods, Ownership, and Totally Incomplete Conversions." *The Velvet Light Trap* no. 64 (2009): 50–63.

Kerr, Aphra. *Global Games: Production, Circulation and Policy in the Networked Era*. New York: Routledge, 2017.

Lessig, L. *Free Culture: The Nature and Future of Creativity*. London: Penguin Press, 2004.

Lessig, L. *Remix: Making Art and Commerce Thrive in the Hybrid Economy*. London: Penguin Press, 2008.

Pearce, Celia. "Productive Play: Game Culture from the Bottom Up." *Games and*

Culture 1, no. 1 (2006): 17–24.

Postigo, H. “Video Game Appropriation through Modifications: Attitudes Concerning Intellectual Property among Modders and Fans.” *Convergence* 14, no. 1 (February 2008): 59–74.

Taylor, T. L. “Pushing the Borders: Player Participation and Game Culture.” In *Structures of Participation in Digital Culture*, edited by J. Karaganis, 112–132. New York: Social Science Research Council, 2007.

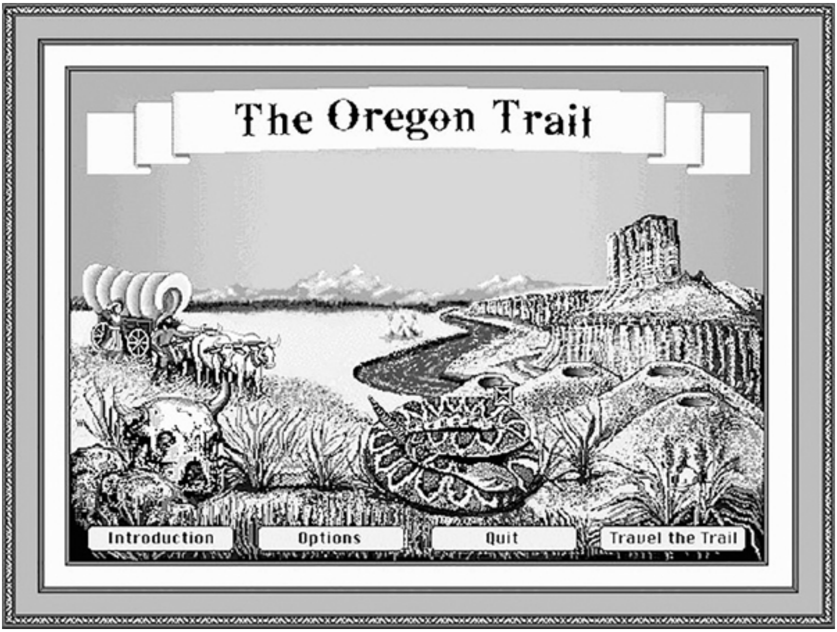
Weber, S. *The Success of Open Source*. Cambridge, MA: Harvard University Press, 2002.

Oregon Trail, The

The Oregon Trail is an enduringly popular series of educational computer games originally imagined as a board game by Carleton College student Don Rawitsch, who was convinced by his roommates, Bill Heinemann and Paul Dillenger, to produce a text-based strategy computer game on teletype, instead of designing a board game, in 1971 (Lipinski 2013). The Minnesota Educational Computing Consortium soon worked to publish the game, releasing it in 1974. The game franchise, designed to teach middle school children about the challenges faced by nineteenth-century pioneers on the Oregon Trail, was meant to ignite students’ interest in American history, particularly units on the westward expansion of the mid-nineteenth century.

Today, *The Oregon Trail* refers to a much wider universe of *The Oregon Trail* computer games, retrogames, video games, and card games. (Pressman Toy Corporation released its first *The Oregon Trail* card game in 2016 and the sequel, *The Oregon Trail: Hunt for Food Card Game*, in 2017.) Pressman also produces the board game *The Oregon Trail: Journey to Willamette Valley* (2018), while also fostering a nostalgic fandom evidenced by listicles (*Buzzfeed’s* 2013 listicle “21 Ways *The Oregon Trail* Traumatized You as a Child”), T-shirts, books, and gimmicky travel promotions (Auber 2017; Reeves 2018). Coming full circle, in 2018, Houghton Mifflin Harcourt published a boxed set of paperback history books for young readers based on *The Oregon Trail*. The books, written with clear goals and choose-your-own-adventure narrative options, put the computer game back into the written format Rawitsch, Heinemann, and Dillenger once worked around.

The Oregon Trail’s biggest distribution push came when the Minnesota Educational Computing Consortium (MECC) took the original paper teletype code that the three Carleton student teachers had written in 1971. MECC was looking for educational software, and *The Oregon Trail* was a working educational game. Once MECC expressed interest, Rawitsch revised the game to make its historical narrative more complex and accurate (Lipinski 2013). Multiple iterations of the game followed and kept pace with developments in computer and video game graphics and styles. In particular, versions of *The Oregon Trail* produced for the Apple II and other Apple systems are the ones most widely played and remembered by children educated in the United States in the 1980s, when Apple put considerable resources into the education market. The 1985 game, the first graphic edition of *The Oregon Trail*, has a points system and includes weather simulations and other features. One popular gameplay element was that players died (frequently and due to a range of illnesses and disasters and as a result of poor resource management). Upon the death of the player or a member of the player's party, a tombstone scene would play.



The start screen for one version of *The Oregon Trail*. New versions of the game have appeared since it first came out in 1971. (Courtesy of Mark J. P. Wolf)

But the item that is perhaps the best indication of how deeply and nostalgically adored *The Oregon Trail* universe has become is the 2018 retro handheld game *The Oregon Trail*, which has a complete 1980s graphical version of the game and is designed to mimic the beige case and look of a 1980s computer one might encounter in the school lab. For the generations of former middle schoolers, seeing an electronic screen display "You have died of dysentery" is not just a momentary textual encounter with nineteenth-century ailments, it is a reminder of educational childhood fun. This nostalgic sheen is important to the continued success and circulation of *The Oregon Trail*'s interface and narrative content: the game's westward migration, pioneer fortitude, and the dangers of nature and poor planning as part of the strategic play involves provisioning and planning that allowed players to virtually travel from Independence, Missouri, to the Willamette Valley in Oregon. Like another popular text produced in the same era, such as the televisual adaptation of Laura Ingalls Wilder's *Little House on the Prairie* series (the TV series airing from 1974–82), these texts simplify, stereotype, and gloss over encounters and tensions with native peoples to depict the westward migration of white settlers (Landry 2017); *Deadwood* (2004–6) it is not.

In 2011, a fortieth anniversary edition of *The Oregon Trail* was released as a single-player simulation game for the Nintendo Wii and Nintendo 3DS. Between 1975 and 2011, seventeen versions of *The Oregon Trail* were released for platforms that ranged from the Control Data Corporation's Cyber 70 mainframe supercomputer to the Apple II, Commodore 64, DOS, Windows, Macintosh, and more, making it one of the most enduring computer games ever and undoubtedly the most enduring educational computer game to date.

Sheila C. Murphy

See also: Education (General)

Further Reading

Auber, Arianna. "This Updated Oregon Trail Game Has Craft Beer and Yoga Instructors." TCA Regional News: Chicago, October 31, 2017. Available at https://www.statesman.com/NEWS/20171103/This-updated-Oregon-Trail-game-has-craft-beer-and-yoga-instructors.

Grosvenor, Emily. "The World of Live Action, Competitive Oregon Trail." *The Atlantic*, September 25, 2014. Available at https://www.theatlantic.com/technology/archive/2014/09/the-true-story-of-real-life-oregon-trail/380730/.

Landry, Alysa. "It's a White Thing: *The Oregon Trail* Game Doesn't Tell Complete History." *Indian Country Today*, June 8, 2017. Available at https://newsmaven.io/indiancountrytoday/archive/it-s-a-white-thing-the-oregon-trail-game-doesn-t-tell-complete-history-xQAG3I7o0EKeeEGw7sCkbQ/.

Lipinski, Jed. "The Legend of *The Oregon Trail*." Mental Floss, July 29, 2013. Available at https://web.archive.org/web/20130731090300/http://mentalfloss.com/article/51930/legend-oregon-trail.

Reeves, Lauren. . . . *And Then You Die of Dysentery: Lessons in Adulting from* The Oregon Trail. New York: Houghton Mifflin Harcourt, 2018.

Slater, Katherine. "Who Gets to Die of Dysentery?: Ideology, Geography, and *The Oregon Trail*." *Children's Literature Association Quarterly* 42, no. 4 (Winter 2017): 374–395.

Wong, Kevin. "The Forgotten History of *The Oregon Trail*, as Told by Its Creators." Vice, February 15, 2017. Available at https://www.vice.com/en_us/article/qkx8vw/the-forgotten-history-of-the-oregon-trail-as-told-by-its-creators.

Outsourcing

Outsourcing is when one company hires another company to complete a particular job rather than having it done internally. This may occur for multiple reasons, for example, because the outside company can do the work more cheaply, more quickly, or because they have the experience or expertise that the job in question requires, or it may be that the company doing the outsourcing has enough work already and prefers to outsource the rest rather than hiring more employees. All of these reasons can be found in the outsourcing done in the video game industry.

In the earliest days of video game development, a single programmer was responsible for programming the entire game; for example, many Atari VCS 2600 cartridges were programmed by individual programmers. As games grew in size and complexity, work was divided between team members, but some types of work, such as music, sound effects, and game character dialogue, were outsourced because production companies did not have in-house composers and voice actors (graphical assets, such as artwork and CG model making, are also sometimes outsourced). Likewise, technical work such as the production of motion capture data was outsourced to companies that had all the required technology and cost less to hire out than to produce in-house. Some types of video game work are more likely to be outsourced, such as the making of ports (other versions of a game) for systems other than the original one (or ones) for which a game was written or the localization of games to fit them into the local culture of a foreign country where a game is being released (see Localization).

By 2009, around 86 percent of game studios were using outsourcing for some aspect of game development (Game Developer Research 2009). Today, collaborations, company acquisition and ownership, branch office locations, and franchised intellectual property (IP) are crossing national boundaries more than ever before, making outsourcing very common. For example, the LEGO Group, a Danish company, hired Travellers' Tales, a British company that is now a subsidiary of the American Company Warner Bros. Interactive (itself owned by conglomerate Time Warner, Inc.), to produce LEGO-themed video games, and to do so, Traveller's Tales outsourced some of the work to the Argentine company Three Melons; the games were then programmed for systems from the United States and Japan; thus, the companies influencing the final form of the LEGO games are located in at least five countries on four continents.

Some game publishers are even wondering whether the video game industry will eventually move to a complete outsourcing model, as is found in other industries, such as motion picture production, where dozens of companies can provide work for a single feature film (Dring 2018). Whatever direction the industry takes, it seems outsourcing will remain an important and common practice.

Mark J. P. Wolf

See also: Industry

Further Reading

Dring, Christopher. "Could Games Development Transition to a Complete Outsource Model?: Keywords Studios CEO Andrew Day Explains Why the Company Is So Active with Acquisitions." Gamesindustry.biz, March 13, 2018. Available at https://www.gamesindustry.biz/articles/2018-03-12-could-games-development-transition-to-a-complete-outsource-model.

Game Developer Research. "Survey: Outsourcing in Game Industry Still on Increase." Gamasutra, April 2, 2009. Available at http://www.gamasutra.com/php-bin/news_index.php?story=23008.

OUYA

The OUYA is a small Android-based video game console that was the result of a Kickstarter campaign begun by Julie Uhrman in 2012 that raised $8.5 million for the system (the first million of which was raised in the first day of the campaign). The OUYA was released to donors and later to the public in 2013, retailing for $99. Every OUYA console is also a developer's kit, encouraging all OUYA owners to become game developers. As the projects' creators stated, "We're handing the reins over to the developer with only one condition: at least some gameplay has to be free. . . . Developers can offer a free demo with a full-game upgrade, in-game items or powers, or ask you to subscribe."

The OUYA features an Nvidia Tegra3 quad-core processor and has 1 GB RAM and 8 GB of internal flash storage, with an HDMI connection and support for up to 1080p HD. It has wireless controllers with standard controls (two analog sticks, D-pad, eight action buttons, and a system button) and a touchpad.

In January 2015, e-commerce Chinese conglomerate Alibaba Group Holding Limited invested $10 million in OUYA to integrate the system's software and games into its own set-top boxes. Despite the investment, the OUYA suffered from relatively weak sales to the public, and the company was put up for sale in April 2015. In July 2015, esports pioneer Razer Inc. acquired OUYA's content library and hired some of the company's staff, both of which were used to develop Razer's own Forge TV microconsole, which was later discontinued in 2016.

Razer shut down OUYA's servers on June 25, 2019, making many of the games unavailable, including those requiring a purchase validation when they are launched. Only games downloaded into the systems will remain. Members of the OUYA community raced to download and preserve as many games as they could before the shutdown (Carpenter 2019). As of June 2019, there were 1,250 games available for the OUYA. Though the system has been discontinued, the OUYA community remains active in online forums, and the system can still be purchased on eBay.

Mark J. P. Wolf

Further Reading

Carpenter, Nicole. "Preservationists Are Racing to Save Ouya's Games before They Disappear." Vice, June 7, 2019. Available at https://www.vice.com/en_us/article/qv7x4p/ouya-is-shutting-down-and-fans-are-preserving-games-before-they-disappear.

OUYA. "OUYA: A New Kind of Video Game Console." Kickstarter. Last updated June 25, 2013. Available at https://www.kickstarter.com/projects/ouya/ouya-a-new-kind-of-video-game-console.

"OUYA Teardown." iFixit, May 7, 2013. Available at https://www.ifixit.com/Teardown/Ouya+Teardown/14224.

Overwatch

Overwatch (2016) is a competitive first-person shooter (FPS) published by Activision Blizzard. Set on a near future version of Earth, *Overwatch* is primarily played by two opposing teams of six in a variety of familiar competitive modes, including King of the Hill (called “Control” in-game), Capture the Flag, and Escort. Drawing inspiration from class-based shooters such as *Team Fortress II* (2007) and multiplayer online battle arenas (MOBAs) such as *League of Legends* (2009), *Overwatch*’s characters—called Heroes—have highly individuated skill kits that contain several abilities with both short cooldowns and an “Ultimate” ability with a longer one. While Blizzard eschewed a free-to-play (F2P) monetization system in favor of a more traditional, upfront sale, *Overwatch* players may purchase cosmetic skins and victory poses for their characters using a “loot box” system in which purchased chests randomly distribute in-game items.

While much of its development history is unclear, *Overwatch* is widely thought to have been salvaged from the wreckage of Activision Blizzard’s failed next-generation massively multiplayer online role-playing game (MMORPG) *Project Titan*, which was in development from the late 2000s until 2014 (Schreier 2016). Shortly after the announcement of *Project Titan*’s cancellation in 2014, Activision Blizzard revealed that *Overwatch* would be the company’s first new franchise in nearly two decades. A small development team reportedly reused a number of assets taken from *Titan*’s competitive multiplayer mode to develop a prototype for a class-based, FPS that later became *Overwatch*.

Upon its release in May 2016, *Overwatch* received both critical and commercial acclaim, winning multiple end-of-year awards and gathering an estimated seventeen million monthly active users in its first year (Carpenter 2017a). In addition to attracting a massive number of players, *Overwatch* gave rise to a vibrant participatory culture in which fans created a striking variety of cosplays, unofficial art, and fan fiction based on *Overwatch*’s cast of characters. (For a time, “Overwatch” was among the most searched terms on a number of pornographic databases [Carpenter 2017b].) *Overwatch* was also noted for its popularity among female and LGBTQ+ persons and communities (Riendeau 2016). Despite that fact (or, perhaps, because of it), *Overwatch* sat at the center of a number of controversies around representation and gaming culture. For example, an official holiday comic for *Overwatch* revealed that Tracer, one of the game’s most iconic characters, was in a same-sex relationship. While many celebrated Activision Blizzard’s inclusion of openly queer characters, others felt that the comic had improperly “politicized” the game. The terms of this debate speak to the tensions that were becoming palpable in *Overwatch*’s fanbase. For many, *Overwatch* was as much a culture built around a compelling universe as it was a competitive game to be mastered.

Overwatch’s most enduring legacy, however, is likely the esports product it spawned, the Overwatch League, which held its first season in 2018. In the wake of *Overwatch*’s release, many third-party tournament organizers began to develop a modest competitive circuit for *Overwatch*, as they had long done for Blizzard’s games. But in November 2016, Activision Blizzard announced its intention to create a permanent, proprietary tournament, Overwatch League, that would be modeled on traditional sports (Szymborski 2016). This design choice was notable for two reasons: first, because, excepting the short-lived Championship Gaming Series for *Counter-Strike* (2000) in the mid-2000s, Overwatch League was the first esports tournament to “geolocate” teams in specific cities (e.g., the Atlanta Reign and Shanghai Dragons) and host “home” and “away” matches, as in many traditional sports leagues, and, second, because Overwatch League, along with the League Championship Series, introduced franchising to esports. Prior to Overwatch League, different esports generally took the form of decentralized “open circuit” ecosystems (similar to professional tennis) or relegation-style leagues (like many European football leagues).

By modeling itself after franchised leagues popular in traditional sports, the design of Overwatch League was intended to create a long-awaited bridge between the game industry and the sports industry, which had long regarded esports with interest but had yet to invest at scale. As Jonathan Kraft, CEO of the Kraft Group, which owns the New England Patriots, told ESPN, “Everybody [in traditional sports] looked at [Overwatch League] and was excited. They saw what we had seen, which is the marriage of the traditional organized league model, with teams in geographies, so cleaning up some of the Wild West nature [of esports], but doing it with a game that was inspiring lots of passion and interest from young people” (Darcy and Wolf 2018). In the end, a number of sports franchises, along with venture capital firms and communications conglomerates, purchased a total twelve slots for a reported $20 million each. The success of Overwatch League has pushed game publishers to develop new franchising tournaments, such as the Call of Duty World League.

William Clyde Partin III

See also: Esports; Online Games

Further Reading

Carpenter, Nicole. “Morgan Stanley Report Says Overwatch League Could Make More Than $100 Million Annually.” Dot Esports, March 27, 2017a. Available at https://dotesports.com/news/morgan-stanley-activision-blizzard-overwatch-league-data-report-13812.

Carpenter, Nicole. “PornHub Confirms: Overwatch Porn Is Obscenely Popular.” Dot Esports, January 6, 2017b. Available at https://dotesports.com/overwatch/news/overwatch-pornhub-popular-search-term-2016-2-4262.

Darcy, Kieran, and Jacob Wolf. “How Blizzard Convinced Sports Billionaires to Buy into the Overwatch League.” ESPN.com, July 27, 2018. Available at http://www.espn.com/esports/story/_/id/24203693/how-blizzard-convinced-robert-kraft-other-billionaires-buy-overwatch-league.

Riendeau, Danielle. “Tracer Is Queer, ‘Overwatch’ Fans Erupt in Excitement.” Vice, December 20 2016. Available at https://waypoint.vice.com/en_us/article/kbwy9m/tracer-is-queer-overwatch-fans-erupt-in-excitement.

Schreier, Jason. “Here’s What Blizzard’s *Titan* MMO Actually Was.” Kotaku, May 23, 2016. Available at https://kotaku.com/heres-what-blizzards-titan-actually-was-1638632121.

Szymborski, Dan. “Blizzard to Create Professional Overwatch League Play.” ESPN.com, November 4, 2016. Available at http://www.espn.com/esports/story/_/id/17968297/blizzard-announces-professional-overwatch-league.

P

Packaging

Video game packaging serves to promote and advertise games in retail stores by attempting to draw the consumer's attention and entice potential players to purchase the game. Early video game packaging often featured artistic conceptions of the gameplay of the packaged games or the themes suggested by the game's title or its play mechanics, sometimes resulting in imagery that had little to do with the game itself or its graphics. The packaging for two games for the Atari VCS 2600 demonstrates this range of representational fidelity to the games themselves: while the box art for Activision's *Pitfall* (1982) depicts a cartoon approximation of the game's core elements and screen, the packaging for *Warlords* (1981) features a painting of a catapult and a medieval knight swinging a sword—quite removed from the gameplay, which involves the player rotating a shield around a collection of blocks in a corner of the screen for protection from the attacks of other players. Although more contemporary packaging still uses artistic renderings of the games themselves, screenshots of a game's graphics and covers that feature these elements more prominently are far more common, in part because of the dramatic improvements in the quality of video game graphics.

Packaging for video games varies between console-based games and home computer games. The packaging for video games made for console systems is often regulated into specific design templates by the console manufacturer for the purposes of uniformity and product recognition. For instance, almost all games made for the Microsoft Xbox One console are sold in a green plastic case with a clear prominent identifier on the upper part of the front cover trim and at the top of the spine that identifies the game as an Xbox One title. Likewise, games made for the Sony PlayStation 4 and the Nintendo Switch feature similarly distinctive packaging. Packaging for computer games has historically been less restricted, resulting in more elaborate retail boxes and packaging materials; for instance, text game developer Infocom often included supplemental material with its games and featured distinctive packaging, such as the round plastic disc encasement for *Starcross* (1982) and a plastic mask in the front of the original box for *Suspended* (1983).

Video game packaging generally consists of a retail box that contains the game cartridge or disc, sometimes in its own protective case; game manuals; and supplemental information, such as maps and reference cards for game controls. Packaging for consoles may also include materials specific to that system, such as the translucent screen overlays included for games for the GCE/Milton Bradley Vectrex system or the plastic overlays used for the controllers of the Mattel Intellivision system.

Electronic Arts (EA) founder Trip Hawkins helped initiate the use of distinctive packaging with his company's first game releases in the early 1980s. Hawkins saw the marketing limitations of the labeled plastic bags in which many computer games were then sold and instead sold EA games in professionally designed custom packaging more akin to the professional packaging found in the music industry.

More elaborate packaging may be found in limited edition, or collector's, versions of games, which feature supplemental materials or unique elements; these special editions of games have grown more elaborate over time, including items such as maps, figurines, soundtrack CDs, supplemental game content, and more. The "Collector's Version" of the Nintendo 64 game *The Legend of Zelda: The Ocarina of Time* (1998) features a gold cartridge instead of the usual gray color, and Microsoft released three different versions of *Halo 3* (2007): the standard version; the "Limited Edition," which was in a metal case and included a supplemental book and disc of bonus materials; and the "Legendary Edition," which included more supplemental disc material and a scaled plastic replica of the main character's helmet for the disc case. Similarly, four versions of *Call of Duty: Modern Warfare 2* (2009) were released, with the most expensive, the "Prestige Edition," including a set of functional night vision goggles. Such limited edition packaging or content is occasionally linked to the prepurchase of games with specific retail stores, to encourage consumers to pay for a portion of an anticipated game before its release to "reserve" a copy and thus be rewarded with special content.

Because packaging for video games typically involves a box that is considerably larger than the cartridge or disc the game contains, several companies and industry initiatives have pushed to reduce the amount of packaging involved. Physical copies of games increasingly include minimal content beyond the game software itself, with even instruction manuals being abandoned in favor of in-game tutorials or digital instructions.

The growth of digital game distribution services such as Valve's Steam, Sony's PlayStation Network, Nintendo Switch Online, or Microsoft's Xbox Live allows games to be sold over the internet, eliminating the necessity for physical game packaging altogether. However, enhanced and collector's editions of digitally distributed games persist and may include supplemental downloadable content, such as digital art books, soundtracks, map packs, additional playable characters or skins, and other similar materials to differentiate the game from a standard edition.

Christopher Hanson

See also: Advertising; Merchandising

Further Reading

Kent, Stephen L. "Album Covers." In *The Ultimate History of Video Games*, 259–276. Roseville, CA: Prima Publishing, 2001.

Loguidice, Bill. "Game Packaging: A Look to the Past When Treasures beyond the Game Were within the Box." Armchair Arcade, May 22, 2006. Available at http://www.armchairarcade.com/armchair-mirror/content1ea7.html?

article.20.

Nutt, Christian. “What’s in a Box? Game Packaging Unpacked.” Gamasutra, December 30, 2009. Available at http://www.gamasutra.com/view/news/26324/Interview_Whats_In_A_Box_Game_Packaging_Unpacked.php.

Pac-Man

Sometimes cited as the most popular and most successful arcade game of all time, *Pac-Man* was primarily developed by game designer Toru Iwatani. It was made in eighteen months and was launched by Namco in Japan in 1979 (it was released in 1980 in North America). Initially, the game was titled *Pakku-Man*, meaning the sound of a mouth opening and closing rapidly and continuously. For the Western market, the title was originally supposed to be *Puck-Man*, and it was for European markets. However, for the North American market, Midway, who owned the *Pac-Man* distribution license for the United States, was afraid that players would scratch away at the *P* and change it to an *F*, so the name *Pac-Man* was used instead.

The legend of *Pac-Man*’s origin says that Iwatani’s idea for the game came to him when a slice of pizza was removed from a pie, thereby inspiring the iconic shape. According to Iwatani himself, it was in this eureka moment that *Pac-Man* was born; however, he later admitted that the Pac-Man figure was also based on the Japanese sign for a mouth combined with eating movements.

The game took the game industry completely by surprise and turned out to be one of the best-selling games ever, taking in more than a billion dollars in revenue. *Pac-Man* has since become an icon of the 1980s and of video games in general. The game’s design moved away from the macho themes of its time, showing that it was possible to make a nonsports and nonshooting game that was compelling and fun, and one that men and women alike would play. *Pac-Man* turned out to be such an enormous success that it was followed with a number of sequels, including *Ms. Pac-Man* (1981), *Super Pac-Man* (1982), *Pac-Man Plus* (1982), *Jr. Pac-Man* (1983), *Pac & Pal* (1983), *Pac-Man & Chomp* (1983), *Professor Pac-Man* (1983), *Pac-Land* (1984), *Pac-Mania* (1987), and *Pac-Man VR* (1996), among others, and many unauthorized clones of the game appeared as well.

The Pac-Man character is a yellow circle with a mouth that opens and closes as he moves through a maze, eating dots and getting chased by enemies, referred to as “monsters” or “ghosts” because of their design, each of which has a personal name. In the U.S. version of the game, the red ghost is Blinky, the pink one is Pinky, the cyan one is Inky, and the orange one is Clyde. In Japan, the red one is Oikake (chaser), the pink one is Machibuse (ambusher), the cyan one is Kimagure (fickle), and the orange one is Otoboke (stupid). If Pac-Man is caught by one of these ghosts, a life is lost, and when all lives are lost, the game ends.

In each corner of the maze, there is a power-up pill that makes it possible to eat the ghosts and gain more points. When the power-up pill is eaten by Pac-Man, the ghosts turn blue for a short time and can be caught by Pac-Man. When caught, their eyes return to the starting point at the center of the maze, where they are reborn. When all the dots are eaten, a new level begins.

There are two well-known bugs in the game. A code bug occasionally allows Pac-Man to pass through a nonblue ghost without losing a life, and numerous player patterns have been developed to take advantage of this. It stems from problems with the game's collision-detection logic, which goes by tile granularity; if Pac-Man and a ghost switch tiles at the same time, no collision is detected. Another bug is the kill-screen bug at level 256. The level is a dead end, even though *Pac-Man* was originally supposed to be a game with no ending. Consequently, it is not possible to go beyond level 256. On July 3, 1999, the first person to achieve the highest possible score at level 255 (3,333,360 points) was Billy Mitchell from Hollywood, Florida, who completed the game in about six hours.

WORLD'S LARGEST
PAC-MAN
INKY
26720
HIGH SCORE
27460
AAAAAAA
27460
ROUND 7

The world's largest *Pac-Man* game, located at the Mall of America in Minnesota. (Thomas Carlson/Dreamstime.com)

A Namco Easter egg also appears in *Pac-Man*. To get to it, one has to put the machine into service mode, wait for the settings screen to come into view, and then quickly toggle the service mode off and on. When an alignment grid appears on-screen, hold down the player 1 and player 2 buttons while toggling service mode on and off again rapidly. If all of this is done correctly, the grid will remain on-screen. Finally, push the joystick up, left, right, and down, four times each, and the message “MADE BY NAMCO” will appear sideways on-screen, spelled out using power-up pills.

Pac-Man’s legacy extends far beyond the game itself. First, there are dozens of sequels; according to Mobygames.com, at least forty-four video game versions of *Pac-Man* have been released. *Pac-Man* became such a huge phenomenon in the 1980s that a hit song came out, “Pac-Man Fever,” and it reached No. 9 on the Billboard Hot 100 Chart. *Pac-Man* also spawned an animated television series that ran from 1982 to 1983. Over the years, a wide variety of *Pac-Man*-themed merchandise has also been sold, including clothing, backpacks, school supplies, glasses, board games, playing cards, handheld games, and other toys—even a specially shaped pasta.

The game continues to be ported to an ever-increasing number of new platforms and systems, and thus *Pac-Man* remains a popular game decades after its release; for example, on May 21, 2010, Google changed the Google logo to a *Pac-Man*-like game called *Pac-Man Doodle* for all the users to play.

Lars Konzack

See also: Arcade Games

Further Reading

Kohler, Chris. *Power-Up: How Japanese Video Games Gave the World an Extra Life*. Indianapolis, IN: Brady Games, 2004.

Lammers, Susan M. *Programmers at Work: Interviews*. New York: Microsoft Press, 1986.

Pittman, James. “The Pac-Man Dossier: Version 1.0.19 February 23, 2009.” 2009. Available at https://www.gamasutra.com/view/feature/132330/the_pacman_dossier.php.

Poole, Steven. *Trigger Happy: Videogames and the Entertainment Revolution*. New York: Arcade Publishing, 2000.

Ramsey, David. “The Perfect Man—How Billy Mitchell Became a Video-Game Superstar and Achieved Pac-Man Bliss.” *Oxford American* no. 53 (spring 2006). Available at https://www.oxfordamerican.org/magazine/item/622-the-perfect-man.

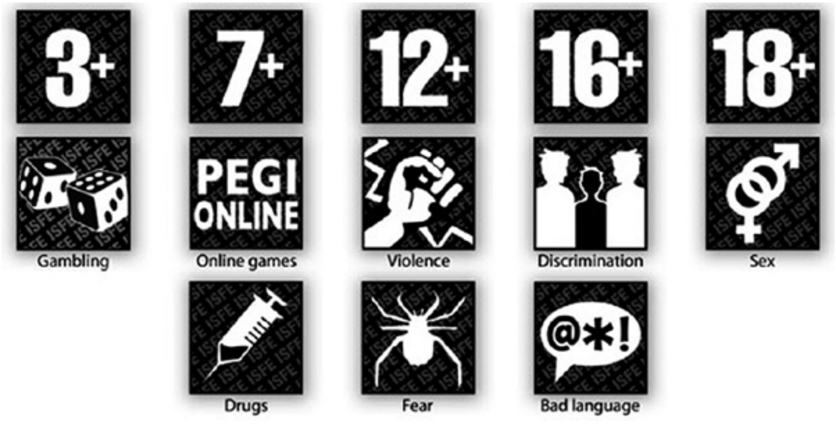
Wolf, Mark J. P. “Video Game Stars: Pac-Man.” In *The Video Game Explosion: A History from PONG to PlayStation and Beyond*, edited by Mark J. P. Wolf, 73–74. Westport, CT: Greenwood Press, 2007.

Pan European Game Information (PEGI) System

The Pan European Game Information (PEGI) system is a European game content rating system that was established to help European parents make informed decisions when buying computer games. The system consists of a rating that indicates suitability by age (3+, 7+, 12+, 16+, or 18+) and content descriptors (Profanity, Discrimination, Drugs, Fear, Sex, Violence, and Gambling) that use easily recognizable icons to identify questionable material. Participation is voluntary for game developers, and to obtain game ratings, a developer completes a questionnaire for evaluating and assigning ratings. In 2015, PEGI added the content descriptor “Online” for games containing online interactions and, in 2018, “In-Game Purchases” for games containing additional paid content.

PEGI was originally developed by the Interactive Software Federation of Europe (ISFE) and has been in use since April 2003. The PEGI system is based on the Dutch Kijkwijzer system and evaluated in the Netherlands Institute for Classification of Audiovisual Media (NICAM). PEGI is the standard rating system for thirty-eight European countries and Israel. In Portugal and Finland, there have been problems with integrating the system into already existing film classification systems. However, minor age rating adjustments specific to these countries solved the problems.

PEGI is organized into two boards and three committees. The Advisory Board is responsible for making recommendations for the continued updating of the Code of Conduct to ensure that social, legal, and technological developments are reflected in the PEGI system. The Complaints Board deals with any complaints regarding ratings and rating procedures. The Criteria Committee works on adapting and modifying the PEGI questionnaire and the underlying criteria to take into account content, technological developments, and recommendations made by the Advisory Board as well as circumstances brought to light by the Complaints Board. The Legal Committee advises the ISFE of any changes to national legislation within participating countries that could have an impact on the voluntary age rating system. Finally, the Enforcement Committee is charged with implementing the recommendations of the Advisory Board and, more generally, of ensuring the enforcement of the provisions of the PEGI Code of Conduct, including the conclusions of the Complaints Board.



Icons used for the Pan European Game Information (PEGI) game classification system. (Courtesy of Mark J. P. Wolf)

An addition to the system, PEGI Online, was introduced in June 2007. Any online gameplay service providers that meet the requirements set out in the PEGI Online Safety Code (POSC) earn the right to display the PEGI Online Logo.

Lars Konzack

See also: Censorship; Entertainment Software Rating Board

Further Reading

Interactive Software Federation of Europe. PEGI Pan European Game Information (PEGI). 2007. Available at http://www.pegi.info.

Interactive Software Federation of Europe. "Video Gamers in Europe—2008." Nielsen Games, 2008. Available at https://ipk.nkp.cz/odborne-cinnosti/docs/ISFE_Consumer_Research_2008_Report_final.pdf.

Pure Electronic Games iOnline. 2007. Available at http://www.pegionline.eu.

Paradox Interactive

Paradox Interactive is a video game publisher in Stockholm, Sweden. Its portfolio includes games developed by its own development branch (Paradox Development Studios) as well as a network of partner developers and subsidiaries that include Obsidian Entertainment (*Pillars of Eternity* [2015] and *Tyranny* [2016]), Colossal Order (*Cities: Skyline* [2015]), Harebrained Schemes (*Battletech* [2018]), and Arrowhead Studios (*Magicka* [2011]). Although its partnership with Obsidian Entertainment demonstrates a willingness to venture into different genres, the company is most readily associated with the particular brand of history-themed strategy games developed by Paradox Development Studios, which combine a fastidious concern for historical realism with "complexity, variety, expandability . . . and the odd technical hitch" (Dean 2013). The company is also notorious for placing a strong emphasis on transparency and community building. This is evidenced in the manner in which its representatives address the media and other members of the video game industry as well as in the design of its internally developed products, which are characterized by high replayability, mod-friendly features, and abundances of postrelease content; by December 2018, *Europa Universalis IV* (2013) had no less than fifteen expansions to its name.

The history of Paradox Interactive traces back to Target Games, a Swedish tabletop games publisher that was broken up into several separate entities in 1999 after experiencing financial difficulties. One of these entities was Paradox Entertainment, whose business primarily consisted of releasing video game adaptations of popular board games. Over the years 1999 to 2004, Paradox Entertainment used its profits to acquire the rights to lucrative intellectual properties (most notably *Conan the Barbarian* and *Solomon Kane*). As the company's business model transitioned toward licensing, the Paradox Entertainment leadership called upon consultant Fredrik Wester to come up with a business plan for its video game division. Wester saw potential in the team and its assets but failed to impress this idea upon his clients, who elected to close down the division. Sensing an opportunity, Wester bought out the studio, retaining the rights to its previous releases and forming Paradox Interactive.

Although the company primarily remained a developer, Wester's vision always entailed a shift toward publishing. This idea materialized in 2006 when, following poor experiences with publishers, Paradox launched its own online distribution platform, GamersGate, to answer the demand from countries where traditional distribution methods were ineffective or impractical. Over the next five years, GamersGate gradually expanded its catalog to over three thousand titles, but the breakthrough came in 2011 with the release of *Magicka* (2011), which became the first Paradox-published title to eclipse the one million sales mark. In 2016, Paradox Interactive entered the stock market, which resulted in a massive influx of capital that allowed the Swedish publisher to make several high-profile acquisitions, such as Seattle-based developer Harebrained Schemes, the Swedish role-playing game publisher White Wolf (the *World of Darkness* series and *Vampire: The Masquerade* [1991]), and, in January 2019, the rights to the *Prison Architect* series, formerly owned by Introversion Software.

Historically a PC-focused company, Paradox has made several forays into the console market, with *Cities: Skylines* being ported to consoles in 2017 and Paradox Development Studios' *Stellaris* (2016) being released on consoles in February 2019.

Etienne Brunelle-Leclerc

See also: Industry; Sweden

Further Reading

Cox, Matt. "Paradox Are Building Tools That Let Modders Tinker with Games While They're Running." Rock Paper Shotgun, October 15, 2018. Available at https://www.rockpapershotgun.com/2018/10/15/paradox-are-building-tools-that-let-modders-tinker-with-games-while-theyre-running/.

Dean, Paul. "Inside Paradox, the Strangest Company in Video Games." Eurogamer, September 25, 2013. Available at https://www.eurogamer.net/articles/2013-09-25-inside-paradox-video-games-strangest-company.

Dean, Paul. "The Paradox of Fredrik Wester." Eurogamer, August 23, 2015. Available at https://www.eurogamer.net/articles/2015-08-23-the-paradox-of-fredrik-wester.

Hall, Charlie. "Solving Paradox: How the Historical Strategy Game Maker Stayed Alive." Polygon, August 7, 2013. Available at https://www.polygon.com/features/2013/8/7/4554042/paradox-interactive-history.

Patent #2,455,992

The first patent for an electronic interactive game was United States Patent #2,455,992, “Cathode-Ray Tube Amusement Device,” which was filed on January 25, 1947, and issued on December 14, 1948, to Thomas T. Goldsmith Jr. and Estle Ray Mann. It was for an analog device that controlled the electronic beam of a cathode-ray tube in an interactive fashion (it did not involve a video signal, however, and what it describes could therefore arguably be denied the status of a “video” game). The beginning paragraphs of the patent describe the proposed invention:

> This invention relates to a device with which a game can be played. The game is of such a character that it requires care and skill in playing it or operating the device with which the game is played. Skill can be increased with practice and the exercise of care contributes to success.
>
> In carrying out the invention a cathode-ray tube is used upon the face of which the trace of the ray or electron beam can be seen. One or more targets, such as pictures of airplanes, for example, are placed upon the face of the tube and controls are available to the player so that he can manipulate the trace or position of the beam which is automatically caused to move across the face of the tube. This movement of the beam may be periodic and its repetition rate may be varied. Its path is preferably caused to depart from a straight line so as to require an increased amount of skill and care for success in playing the game.
>
> The game can be made more spectacular, and the interest therein both from the player’s and the observer’s standpoint can be increased, by making a visible explosion of the cathode-ray beam take place when the target is hit.

After this introductory abstract, the patent goes on to describe the circuitry in detail, referencing diagrams included in the patent. Apparently, the patent’s authors did not market or exploit their invention, nor did it appear to be an obstacle to later video game developments.

Mark J. P. Wolf

See also: “First” Video Game

Further Reading

Dannenberg, Ross A. Stephen Mortinger, Roxanne Christ, Chrissie Scelsi, and Farnaz Alemi, eds. *Computer Games and Virtual Worlds: A New Frontier in Intellectual Property Law*. Chicago: American Bar Association Books, 2010.

United States Patent 2,455,992. “Cathode-Ray Tube Amusement Device.” Issued to Thomas T. Goldsmith Jr. and Estle Ray Mann. Application January 25, 1947. Accessed April 20, 2010. Available online at http://www.google.com/patents?id=n-NZAAAAEBAJ&printsec=abstract&zoom=4&source=gbs_overview_r&cad=0#v=onepa

Pause Function. *See* Help Function

PC Bangs

A *PC bang* is a South Korean internet cafe that is open twenty-four hours for people to play computer games. It belongs to part of the public room culture, where young Koreans gather to socialize and consume small room entertainment in venues such as video bangs, karaoke bangs, comic book bangs, and so on. The cost of accessing a PC bang is cheap, and the price ranges from 1,000 to 1,500 Korean won (equivalent to USD 1.30) per hour. Users can relax in an air-conditioned room and conveniently order food and drink in their own seats. They can also enjoy playing games with high-speed internet and high-end gaming equipment.

The history of the PC bang dates back to the late 1990s, when the South Korean government developed broadband infrastructure to transform the country's information economy. After the 1997 International Monetary Fund (IMF) financial crisis, some unemployed IT workers set up PC bangs to begin new businesses after they lost jobs in the IT sector. Since then, the PC bang has become an important gaming center that has led to the global rise of Korean gaming culture (Huhh 2007). The vibrant gaming environment in the PC bang contributed to the emergence of early popular titles, including *StarCraft* (1998), *Lineage* (1998), *MapleStory* (2003), and *Kart Rider* (2004) (Kang 2014). After two decades, the PC bang is still a billion-dollar business. In 2017, the PC bang industry accounted for 1,760 billion Korean won (USD 1.4 billion) in its annual sales. In 2018, over ten million people visited PC bangs in South Korea. The number of PC bangs grew from three thousand in 1998 to more than twenty thousand in the 2000s. Despite the decrease after 2010, the number of PC bangs still remains at 10,418, and their sales revenue increased to 2,334 Korean won (USD 1.9 billion) in 2019.

The significance of the PC bang can be explored in two dimensions. First, the cultural dimension shows that the PC bang shapes the everyday gaming culture in South Korea. Because the home has never been a place for video games in most Korean families, the PC bang is a new "home" for young gamers to visit after school (Shim, Kim, and Martin 2008). The numerous tournaments held weekly at PC bangs allow players to hone their skills for competitive gameplay. Gamers learn from each other, gaining experience to boost all characters. In particular, esports is now a rapidly growing industry, as more and more young gamers choose professional gaming to build a career path in Korea. The top-ranked esports titles that are played in PC bangs include *Sudden Attack* (2005), *League of Legends* (2009), *StarCraft II: Wings of Liberty* (2010), *Counter-Strike: Global Offensive* (2012), *Dota 2* (2013), *Hearthstone* (2014), *Heroes of the Storm* (2015), *Overwatch* (2016), and *PlayerUnknown's Battlegrounds* (2017).

Second, in the economic dimension, PC bangs also benefit the Korean game industry by functioning as a stable network for game delivery. The success of *Lineage* and *MapleStory*, through PC bangs, helped Korean game developers NCSoft and Nexon try out innovative payment and distribution models for online games (Huhh 2007).

However, the PC bang industry has also had a controversial impact on Korean society. In 2006, some PC bangs were shut down during the "Sea Story" scandal, which involved large-scale illegal internet gambling. In 2011, the Korean government passed a shutdown law, the Youth Protection Revision Act, to solve the problem of internet addiction. Also known as the Cinderella Law, it regulates teens from playing computer games from midnight to 6:00 am. In 2013, the Korean government enacted a smoke-free law in public places that also includes smoking bans at the PC bangs. PC bang owners objected to both laws during the legislation process.

Peichi Chung

See also: South Korea

Further Reading

Huhh, Jun-Sok. "PC Bang Inc.: The Culture and Business of PC Bang in South Korea." SSRN, 2007. Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=975171.

Kang, Inkyu. "It All Started with a Bang: The Role of PC Bangs in South Korea's Cybercultures." In *The Korean Popular Culture Reader*, edited by Kyung Hyun Kim and Youngmin Choe, 55–75. Durham, NC: Duke University Press, 2014.

Shim, Youn Ja, Min-Sun Kim, and Judith Martin. *Changing Korea: Understanding Culture and Communication*. New York: Peter Lang, 2008.

PC-Engine. *See* NEC PC-Engine/TurboGrafx-16

PEGI. *See* Pan European Game Information System

Performance

Digital performance has its roots in many overlaps between different artistic and scholarly fields. Since the 1970s, performance studies has emerged as an interdisciplinary research field that expands from theater studies but concentrates on the analysis of performative actions and behaviors (Schechner 2002). It includes aspects of more established fields, such as anthropology, communication, psychology, gender studies, or theater studies, but distinguishes itself from neighboring disciplines through its focus on the performance itself (instead of, e.g., the written text). From the position of performance studies, *digital performance* has been defined as "all performance works where computer technologies play a *key* role rather than a subsidiary one in content, techniques, aesthetics, or delivery forms" (Dixon 2007, 3). The increasing use of various media in experimental performance pieces that include not only video but also real-time three-dimensional imagery, robots, and hybrid stages has strengthened connections between the development of performance art and interfaces of evolving new media (Chatzichristodoulou, Jefferies, and Zerihan 2009; Dixon 2007), and it has actively contributed to the intermediality of performances (Chapple and Kattenbelt 2006) as well as their documentation and archiving. In return, the media-driven and technological aspects have taken on a growing role in the theory of performance studies affecting is production (McKenzie 2001), liveness (Auslander 2008), and audiences, among other facets.

Focusing on performance as a process and discussing possibilities of performing machinery bears close connections to interactive media, which also highlights procedural qualities and forms of participation. “Computers as theatre” (Laurel 1991) have been discussed in the field of interface design, and games have been presented as “cyberdramas” (Murray 2004) that provide certain narrative and dramatic opportunities. These cases allow a reinterpretation of players as interactors, game worlds as virtual stages, and play as performance. The resulting influences of dramatic arts can be traced in human-computer interaction design, artificial intelligence, and virtual character and game designs, to name a few of the evolving connections. Interaction designers have been inspired by scholars and performance artists from Aristotle to Brecht, Boal, and Kaprow, and many research groups have either hosted or collaborated with performing artists such as Laurie Anderson, Blast Theory, STELARC, or Char Davies to produce instances of digital performances (Giannachi 2004). Performance turns to digital technology to gain new expressive tools for a piece acknowledged as performance, framed and situated as an artistic event.

Game scholars, on the other hand, use references to theater and performances to look at games as performances to find a suitable critical frame for the emerging digital expressions available in games. The gap between the two narrows as both fields, performance studies and game studies, continue to evolve, and a definite categorization of the cross-references between the two is difficult; however, basic questions of body/identity/gender, space and time of the performance, role of the audience, and sociocultural context are overlapping research fields in both disciplines. Even more precise questions regarding the role of the automaton, artificial intelligence (AI), the debate on liveness, and the identity of a virtual character are part of the research and artistic practice in both fields.

Michael Nitsche

See also: Gender; Space (Visual); Time

Further Reading

Auslander, Phil. *Liveness: Performance in a Mediatized Culture*. 2nd ed. New York: Routledge, 2008.

Benford, Steve, and Gabriella Giannachi. *Performing Mixed Reality*. Cambridge, MA: MIT Press, 2011.

Chapple, Freda, and Chiel Kattenbelt, eds. *Intermediality in Theatre and Performance*. Amsterdam, Netherlands: Rodopi, 2006.

Chatzichristodoulou, Maria, Janis Jefferies, and Rachel Zerihan, eds. *Interfaces of Performance*. Farnham, England: Ashgate Publishing, 2009.

Dixon, Steve. *Digital Performance: A History of New Media in Theater, Dance, Performance Art, and Installation*. Cambridge, MA: MIT Press, 2007.

Giannachi, Gabriella. *Virtual Theatres: An Introduction*. New York: Routledge, 2004.

Laurel, Brenda. *Computers as Theatre*. Boston, MA: Addison-Wesley Publishing Company, 1991.

McKenzie, Jon. *Perform or Else: From Discipline to Performance*. New York: Routledge, 2001.

Murray, Janet. "From Game-Story to Cyberdrama." In *First Person: New Media as Story, Performance, and Game*, edited by Noah Wardrip-Fruin and Pat Harrigan, 2–9. Cambridge, MA: MIT Press, 2004.

Salter, Chris. *Entangled: Technology and the Transformation of Performance*. Cambridge, MA: MIT Press, 2010.

Schechner, Richard. *Performance Studies. An Introduction*. 2nd ed. New York: Routledge, 2002.

Peripherals

Peripherals are devices that are connected (via a physical connection such as a cable or a wireless connection via an electronic signal) to a video game console or computer to provide extra functionality, and the term does not usually refer to media storage devices such as cartridges, discs, or memory cards. Television screens and computer monitors function as peripherals to video game systems because they are not usually included in the console itself, but audio speakers and headphones could be included as peripherals.

Apart from screens and speakers, the most common peripherals are game controllers. Some of the earliest controllers were built into game consoles directly, whereas later ones were plugged into a console via cables. Today, many controllers are wireless, allowing players more freedom of movement. Examples of game controllers that are peripherals include devices such as paddles (which are dials), joysticks, Joyboards, joypads, trackballs, light guns, guitars, keyboards, drum sets, and motion-based controllers, such as the Wii Remote (sometimes called the "Wiimote") for the Nintendo Wii.

Besides controllers, there have been a number of other peripherals used with video games to enhance gameplay while not always being necessary to it. For example, the Atari VCS 2600 had keypads for entering numerical information, the Magnavox Odyssey^2 had a speech and sound effects module called "The Voice," and the GCE/Milton Bradley Vectrex had a light pen that could be used directly on the screen. The SEGA Master System (SMS) could be used with the SEGAScope 3D glasses, and other companies, such as Stereographics Corporation and 3DTV Corporation, produce 3-D glasses that can be used with some video games. The 3rd Space Gaming Vest, by TN Games, uses force-feedback technology to physically simulate the impact of bullet hits, grenade blasts, and other events to the player's torso. The vest uses eight pneumatic air pockets that inflate and deflate in various places around the player's chest and back to simulate directional impacts. There are also a growing number of augmented reality (AR) and virtual reality (VR) peripherals that create new gaming experiences for players.

Some peripherals are used for data storage and work with programmable data storage media. The Famicom Disk System, released in 1986 for the Nintendo Famicom/Nintendo Entertainment System (NES), connected the first console to a proprietary floppy disk drive and used "disk cards" for storage. The NEC PC-

Engine/Turobgrafx-16 was the first console to have a CD-ROM peripheral, the Turbografx-CD. Other devices, such as the SEGA CD/Mega-CD, also allowed a game system to use a CD-ROM drive. The Nintendo e-Reader scanner, made for the Game Boy Advance and released in 2001, had an LED scanner that could read encoded data printed on paper cards, which were used by certain games to unlock items or play minigames.

One video game peripheral is not even sold commercially to consumers. The PediSedate, invented by medical doctor Geoffrey Hart, is a headset that attaches to the Nintendo Game Boy and is used to reduce the trauma children feel during medical or dental procedures. As the child plays, the system monitors respiratory functions and delivers nitrous oxide as needed, keeping the child distracted and sedated until the procedure is finished. As this peripheral demonstrates, as video games find new uses, new peripherals will continue to appear that adapt games even more to other tasks and purposes.

Mark J. P. Wolf

See also: Generations of Technology; Joysticks

Further Reading

PediSedate website. Accessed September 23, 2020. Available at: http://www.pedisedate.com/Home.html.

TN Games website. Accessed October 11, 2020. Available at http://tngames.com/pages/Company-Profile/Technology.

Persistent Games

Online gaming experiences taking place in a persistent-state virtual world (PSW) may be referred to as *persistent games*. In their computer-based simulated environments that almost never stop, these games' histories, challenges, and inhabitants are persistently present, twenty-four hours a day, seven days a week. Players interact directly or through avatars, with rules based on the real world, fantasy worlds, or hybrid variations. These games continually run on servers and guarantee data persistence even if (hypothetically) no one is playing. Some of them keep evolving when the player is disconnected because other users continue playing. Types of persistent games include multiuser domain or multiuser dungeon games (MUDs), massively multiplayer (MMP) games, massively multiplayer online games (MMOGs), and massively multiplayer online role-playing games (MMORPGs). Persistent browser-based games (PBBG) are also accessed and played over the internet directly through a web browser. Game and world persistence may also be partial or simulated: some virtual worlds reset periodically, and multiplayer games may distribute events between different game sessions and mobile devices. Persistent game elements can be noticed in video games from as early as the 1980s, such as *Trade Wars* (1984), designed by Chris Sherrick, or *Orb Wars* (1989).

Persistent games have qualities that single-player and session-based multiplayer games usually do not have: virtual societies partially defined by hundreds or thousands of users simultaneously joining in the same game spaces. This web of social relationships is a major factor in the success or failure of a persistent game, which is composed of many systems. Social systems imply communication, groupings, and often possibilities to participate in organized events and social rituals enacted by players. Several of these groups, like the worlds they flourish in, are persistent from one playing session to another. Developers give various appellations to these officially structured, and usually large, player associations: organizations, allegiances, guilds, and so on. Political systems that manage voting mechanics may also be present in some persistent games, such as *Dark Ages* (Nexon/KRU Interactive, 1999), as well as multifaceted economic systems, like that of *EVE Online* (CCP Games, 2000). Robust markets allowing in-game currency, goods, and character exchanges, such as in *World of Warcraft* (Blizzard Entertainment, 2004), have also seen the rise of virtual goods sold for real money.

Although the persistent games business is risky, especially for games presenting rich fictional worlds, it can be highly profitable if successfully handled. In this market, scale is a major issue in profitability, mainly because of the substantial fixed operating cost necessary to develop, launch, and run these operations. This is explained by persistent games' particular requirements, such as having (or connecting to) registration, authentication, and billing systems; a client/server networking system; servers with databases independent from the client software to run the game on; and security coding to prevent hacking and cheating. However, the value of the audience is more considerable than its size, as good role players both encourage other players to act reciprocally and keep others in the "magic circle" of the game longer.

Vincent Mauger

See also: Massively Multiplayer Online Role-Playing Games; Multiuser Domains

Further Reading

Bartle, Richard. *Designing Virtual Worlds*. Indianapolis, IN: New Riders, 2003.

Castronova, Edward. *Synthetic Worlds: The Business and Culture of Online Games*. Chicago: University of Chicago Press, 2005.

Koster, Raph. "The Online World Timeline." Available at http://www.raphkoster.com/gaming/mudtimeline.shtml.

Mulligan, Jessica, and Bridgette Patrovsky. *Developing Online Games: An Insider's Guide*. Indianapolis, IN: New Riders, 2003.

Walton, Gordon, and James Daniel, eds. *2004 Persistent Worlds Whitepaper*. IGDA Online Games SIG. Available at https://www.scribd.com/document/35860154/IGDA-PSW-Whitepaper-2004.

Pervasive Games

Pervasive games combine actual and virtual platforms in their gameplay. In a narrow sense, their features are twofold. First, pervasive games are generally understood to be transmedial; they use one or more technological devices or online platforms combined with traditional environments. Second, they integrate actual spaces in the game experience, either by using players' locations for the game's progress or by contextualizing real-life settings as the game space (Benford, Magerkurth, and Ljungstrand 2005). In a broader sense, the concept can refer to games and resulting player behavior that expand the "magic circle" and transfer the game space to an actual context, be it temporal, spatial, or social (Montola, Stenros, and Waern 2009).

Historically, one of the oldest forms of pervasive gaming is scavenger hunting (Montola, Stenros, and Waern 2009, 32–34). An early example of this is letterboxing, which finds its origins in England in the mid-nineteenth century. In this game, players hide weatherproof boxes and distribute clues of their location across various media, for instance, by making use of postal services. Some more recent forms of pervasive gaming rely on similar principles, such as geocaching. Here, players make use of GPS devices to locate coordinates and retrieve "caches," containers with certain objects in them. Recent pervasive games are rather hybrid forms of gaming that find their origins in playground games (such as tag), role-playing games, urban games, and mystery games.

The main genres of pervasive games are location-based games, augmented games, and alternate reality games. Location-based games actively use the player's location to progress the game by using displays, wireless communications, and sensing technologies (Benford, Magerkurth, and Ljungstrand 2005, 56); geocaching is an example of this genre. Similarly, Blast Theory's multiplayer game *Can You See Me Now?* (2002) is a game of catch that requires actual runners to tag online players. Augmented reality (AR) games are traditional games effectively expanded through various technologies. The first AR game that received mainstream attention was *Pokémon GO* (2016), developed by Niantic, known also for the AR game *Ingress* (2012). A more advanced example of an AR game is *STARS* (Magerkurth et al. 2005), a tabletop variation that uses a smart table, wireless communication, and game software (see Augmented Reality).

Alternate reality games (ARGs) are interactive narratives staged in the real world that use various media to tell their stories (Montola 2009, 37–40). In this genre, players often cooperate to solve puzzles and challenges. Unlike the previous genres, ARGs are often used as a promotion tool by the media industries. The first ARG game was *Publius Enigma* (1994), which was published before the release of Pink Floyd's *The Division Bell* (1994). It was followed by the more popular *Beast* (2001), the ARG related to Steven Spielberg's movie *A.I.: Artificial Intelligence* (2001). Since then, many ARGs have been created by player communities as well, such as *Unfiction* (2002). ARGs are still often used to promote new movies or television series or to add content to existing ones (such as *Lost* [2004–10] and *The Dark Knight* [2008]). They form a prime example of what Henry Jenkins (2006) describes as transmedia storytelling: the spread of narrative content across various media platforms.

As a type of game, pervasive games are still growing, but they are also growing more difficult to define. Persistent games, such as massively multiplayer online role-playing games (MMORPGs), often have an impact on daily life in social terms (as in the establishing of friendships) and economical terms (e.g., the selling of characters). However, they do not meaningfully integrate actual platforms from the real world in their gameplay. Still, some features, such as advertising, blur the boundaries between the virtual and actual. For example, in 2005, *EverQuest* (1999) included an option to order pizzas from Pizza Hut. Likewise, games that recontextualize real life are not always pervasive. Urban games such as parkour, which views the cityscape as a set of obstacles one can use for free running, transfer the actual environment to a game setting but do not use any additional media. Similarly, it can be argued whether mimetic interfaces (such as Nintendo Wii applications and smart toys) blend the actual and virtual or only enhance existing games.

For players, pervasive gaming is attractive because it enables exciting new forms of play that use unexpected technologies and situations. In popular culture, the film *The Game* (1997) depicts the uncertainty and thrill these games can have for players. Because pervasive games entwine actual life with the play of make-believe, immersion in these games is especially strong (McGonigal 2003). These games also provide many opportunities for creative, emergent play. They often force players to join hands online and off-line, thus motivating co-creativity. Academically, pervasive games have not been very widely discussed. In player communities, however, these games and elements of them continue to develop.

Nicolle Lamerichs

See also: Ubiquitous Games

Further Reading

Benford, Steven, Carsten Magerkurth, and Peter Ljungstrand. "Bridging the Physical and Digital in Pervasive Gaming." *Communications of the ACM* 48, no. 3 (2005): 54–57.

Björk, Staffan, Jennica Falk, Rebecca Hansson, and Peter Ljungstrand. "Pirates!—Using the Physical World as a Game Board." In *Proceedings of Interact 2001, IFIP TC.13 Conference on Human-Computer Interaction*, 423–430. Amsterdam, Holland: IOS Press, 2001.

Jenkins, Henry. *Convergence Culture*. New York: New York University Press, 2006.

Magerkurth, Carsten, Adrian David Cheok, Regan L. Mandryk, and Trond Nilson. "Pervasive Games: Bringing Computer Entertainment Back into the Real World." *ACM Computers in Entertainment* 3, no. 3 (2005). Available at https://dl.acm.org/doi/10.1145/1077246.1077257.

McGonigal, Jane. "A Real Little Game: The Performance of Belief in Pervasive Play." In *DiGRA Level Up Conference Proceedings*, 2003. Available at http://www.avantgame.com/MCGONIGAL%20A%20Real%20Little%20Game%20DiGRA%202003.pdf.

Montola, Markus, Jaako Stenros, and Annika Waern. *Pervasive Games: Theory and Design*. San Francisco: Morgan Kaufmann, 2009.

Walther, Bo Kampmann. "Pervasive Gaming: Formats, Rules and Space." *Fibreculture Journal* 8 (2006). Available at http://eight.fibreculturejournal.org/

fcj-053-pervasive-gaming-formats-rules-and-space.

Phenomenology

Phenomenology is a philosophical method used to describe phenomena the way they appear. As opposed to phenomenalism (e.g., a “stream of consciousness” description in a novel in which *contingent* presence is given, i.e., what a viewer perceives at a given moment), phenomenology aims at the very logic of phenomena, that is, the essential structure or *necessary* aspects of presence. Thus, among all media, video games are excellent objects for phenomenological analysis.

The term *phenomenology* for the description of phenomena as such was first used in the eighteenth century by Johann H. Lambert (1728–77) and then became widely known through the book *The Phenomenology of Spirit* (1807) by Georg W. F. Hegel (1770–1831). However, it took until the early twentieth century before the method was accepted as a philosophical approach, when Edmund Husserl (1859–1938), as well as his disciples, successors, and opponents—such as Martin Heidegger (1889–1976)—investigated the phenomenological structure of appearances. The phenomenological movement still persists and has followers all over the world, including the French philosopher Maurice Merleau-Ponty (1908–61), who was heavily criticized by structuralists such as Michel Foucault (1926–84) for an assumed/alleged subject-centric view.

It is due to this critique that the notion prevails to this day that phenomenology always has to deal with how something appears to a particular subject. This notion was also supported by the fact that the basis for Husserl’s investigations in most cases was his own experience. One’s own experience is indeed a starting point for phenomenology, but not its aim (because this would lead to phenomenalism). Rather, the aim is to abolish anything that is not an appearance because there is the idea of the subject itself (which does not appear as a phenomenon). This so-called phenomenological reduction thereby leads to a crossing out of the subject from philosophy, as it has been introduced by René Descartes (1596–1650) in his *Meditations on First Philosophy* (1641). If the subject can be perceived phenomenologically at all, it is the sum of all perceptions, as David Hume (1711–75) had already claimed in his *Treatise Concerning Human Understanding* (1739–40).

Thus, in some cases, the phenomenology of video games is understood as the experience of a (bodily existing) subject that has to be taken into consideration when analyzing these artifacts (Mellon and Webb 2006; Nielsen 2010). Such an approach leads directly into a discussion of the question of immersion (Poulin 2008), which is a contingent moment of getting lost in the game world and is phenomenalistic in approach, not phenomenological. In contradiction to this, a radical crossing out of the subject under phenomenological premise has been claimed by Ian Bogost (2008), who argues that the phenomenology of video games has to be an “alien phenomenology” that describes the experience of the game itself—how it appears to the computer.

As video game studies show, the phenomenological method can be applied without explicit reference to the phenomenological tradition. For example, phenomenological approaches can be found in game classifications, in which games are grouped according to genre definitions or technical qualifications. This is especially the case when video games are addressed as imagery and when their pictorial structure is described. Furthermore, this means that whereas genre classifications describe the content of a game (such as "adventure") and technical classifications refer to the material basis (such as "arcade"), phenomenological descriptions focus on the medial form of the game's image or the form of possible interactions within it; that is, in a phenomenological perspective, these forms are the main perceptual characteristics of the mediation process.

Some examples include Mark J. P. Wolf's (1997) formal description of the relation between on-screen and off-screen spaces in games and Espen Aarseth et al.'s (2003) typology of games. Both approaches do not assign themselves to the phenomenological tradition explicitly, but they do describe essential structures of games as they appear, without supposing that the apparent structure is contingent (i.e., subject to individual perception). Whereas Wolf's description follows a historical succession of forms, Aarseth et al.'s phenomenology is transcendental in the strict sense, which means that they do not only give (historical) examples for typical forms but identify the possible realm of the appearance of games. In the case of the spatial appearance of games as phenomena, this means that they can vary within the range of a topological or geometrical gaming principle, as can be found in chess on one hand and a first-person shooting game on the other. For such a transcendental phenomenology, there do not have to be given examples that match the extremes—such as chess being purely "topological" and shooting games being purely "geometrical"—but it is only claimed that all possible games have to be in between these two poles. (e.g., real-time strategy [RTS] games can be topological in respect to navigation but geometrical in respect to combat.) Therefore, with Clara Fernández-Vara et al. (2005), it can be argued that the phenomenological description of video games also has to take into consideration the possible discrepancy between navigational space and visible space.

Transcendental phenomenologies have already been used in art history (and also without being named a phenomenology) to analyze paintings. An example is the Swiss art critic Heinrich Wölfflin (1864–1945), who in his *Principles of Art History* (1915) defined the (transcendental) principles of pictures (being the "condition of possibilities"), stating that the space of an image can either be "flat"—as in many paintings of the Renaissance—or "deep," as in many paintings of the Baroque. Flatness, according to Wölfflin, does not mean that there is no perspective with the illusion of visual depth (as was the case in medieval paintings) but rather that elements in the picture are all arranged in the same layer of the picture or that the walls have no textures and there is hardly any variation in illumination, as is the case in Leonardo da Vinci's *Last Supper*. In contrast to that is Velazquez's *The Fable of Arachne*, in which the walls have rich texture, the figures are arranged in different layers, and the z-axis depth is accentuated through shadow and light. This phenomenological approach can easily be applied to game genres; for example, if early first-person shooting games are compared with later ones, the style of space in *Wolfenstein 3D* (1992) is flat compared with that of *DOOM 3* (2004), which is deep. In early shooting games, the floor and ceiling had no textures, and non-player characters (NPCs) acting as opponents were limited to moving within a discrete set of planes set at different distances along the z-axis. The opposite occurs in “baroque” shooters a decade later: all rooms have texture-mapped surfaces, opponents can move freely along the z-axis, and the movement through the game space overall has a higher degree of freedom.

Because the subject (as the agent of experience) is reduced within a phenomenological description, the first person can nevertheless be described as a transcendental phenomenological subject. This is one of the reasons why first-person shooters (FPSs) are, because of their structure, the best candidates for phenomenological description and also why they are, in turn, crucial for phenomenology itself: FPSs inherit a phenomenological structure known as an *ipseity*. *Ipseity*, or “selfness,” is a term that was explored by the French phenomenologist Michel Henry (1922–2002) in his book *Incarnation: A Philosophy of the Flesh* (2000). The term *flesh*, as a philosophical concept, was introduced by Merleau-Ponty to point out that the subject cannot be conceived as pure thought (as in Descartes’s notion of the thinking essence, or *res cogitans*), but it does have perceptions, sensations, and feelings. In the early works of Merleau-Ponty, such as *Phenomenology of Perception* (1945), those appearances were ascribed to the body, or the corps one possesses (*corps propre*), which nevertheless is still an entity and finally a substitution for the Cartesian ego (and thus was justly criticized). In his later writings, especially in the posthumously published *The Visible and the Invisible* (1964), Merleau-Ponty introduced the concept of the flesh to point out that it is not about the body as a unity but about the body in its sensitivity (flesh thus evokes a body that has even been deprived of its skin) and entanglement with the world, in case of games: the acting within it by means of telepresence (Klevje 2012).

Even though the ego in an FPS is not presented as a full body, its sensitivity is depicted by simulating sensations (like dizziness of the screen or a reddish tinting of vision, both indicating a subjective state) as well as the ability of the image itself to relate. This approach, which considers the ego as an appearance with a structure that is of selfness can also be found in analytic philosophy or philosophy of language, as in the works of G. E. M. Anscombe (1919–2001), Hector-Neri Castañeda (1924–91), and Roderick M. Chisholm (1916–99), who come to similar conclusions, stating that the *I* is not an entity whose existence can be proven but that there is the (perceivable) perspective of the first person, which cannot be deduced from another perspective (the second person or third person). FPS thus explicate the phenomenological (as well as grammatical) structure of the first person as ipseity (or a “Me”) without claiming the existence of the ego (or an “I”), which in turn leads to the constitution of a “ludic self” (Vella 2015).

FPS basically do this through the perspectival structure in which not only the objects of the image are depicted—as is the case in movies, which also offer a transcendental subjectivity (Crick 2011; Sobchack 1992)—but from which the main game principle is derived, which is the centralization of the pictorial objects at the vanishing point. In addition, the subject’s sensitivity is exemplified through modifications of the pictorial style to indicate a subjective state, such as through coloration or blurring (when the subject of the first-person perspective gets shot). Philosophically speaking, video games can offer insight into theoretical problems regarding phenomenology because of their ability to instantiate an interactive first-person perspective point of view.

Stephan Günzel

See also: Ontology

Further Reading

Aarseth, Espen, Solveig Marie Smedstad, and Lise Sunnanå. "A Multi-Dimensional Typology of Games." In *Level Up: Digital Game Research Conference*, edited by Marinka Copier and Joost Raessens, 48–53. Utrecht, Netherlands: University of Utrecht, 2003.

Anscombe, G. E. M. "The First Person." In *Mind and Language*, edited by Samuel Guttenplan, 45–65. Oxford, UK: Clarendon Press, 1975.

Bogost, Ian. "The Phenomenology of Videogames." In *Conference Proceedings of The Philosophy of Video Games Conference*, edited by Stephan Günzel, Michael Liebe, and Dieter Mersch, 22–43. Potsdam, Germany: Potsdam University Press, 2008.

Castañeda, Hector-Neri. *The Phenomeno-Logic of the I: Essays on Self-Consciousness*. Bloomington: Indiana University Press, 1999.

Chisholm, Roderick M. *The First Person: An Essay on Reference and Intentionality*. London: Harvester, 1981.

Crick, Timothy P. "The Game Body: Toward a Phenomenology of Contemporary Video Gaming." *Games and Culture* 6, no. 3 (2011): 259–269. Available at https://doi.org/10.1177/1555412010364980.

Fernández-Vara, Clara, José Pablo Zagal, and Michael Mateas. "Evolution of Spatial Configurations in Videogames." In *Changing Views—Worlds in Play: Proceedings of DiGRA 2005 Conference*. 2005. Available at digra.org/dl/db/06278.04249.pdf.

Günzel, Stephan. "The Space-Image: Interactivity and Spatiality in Computer Games." In *Conference Proceedings of The Philosophy of Computer Games 2008*, edited by Stephan Günzel, Michael Liebe, and Dieter Mersch, 170–188. Potsdam, Germany: Potsdam University Press, 2008.

Klevje, Rune. "Enter the Avatar. The Phenomenology of Prosthetic Telepresence in Computer Games." In *The Philosophy of Computer Games*, edited by John Richard Sageng, Hallvard Fossheim and Tarjei Mandt Larsen, 17–38. Dordrecht, Heidelberg, New York, and London: Springer, 2012.

Mellon, Bride, and Brian Webb. "Applying a Phenomenological Approach to Games Analysis: A Case Study." *Simulation and Gaming* 37, no. 2 (2006): 209–225.

Nielsen, Henrik Smed. "The Computer Game as a Somatic Experience." *Eludamos* 4, no. 1 (2010): 25–40.

Poulin, Patrick. "Phenomenology." In *The Video Game Theory Reader 2*, edited by Bernard Perron and Mark J. P. Wolf, 372–373. New York: Routledge, 2008.

Sobchack, Vivian. *The Address of the Eye: A Phenomenology of Film Experience*. Princeton, NJ: Princeton University Press, 1992.

Vella, Daniel. *The Ludic Subject and the Ludic Self: Analyzing the "I-in-the-*

Gameworld." PhD diss., IT University of Copenhagen, 2015.

Wolf, Mark J. P. "Inventing Space: Towards a Taxonomy of On- and Off-Screen Space in Video Games." *Film Quarterly* 51 (1997): 11–23.

Philips CD-i

The Philips CD-i is a multimedia entertainment system released by the Dutch electronics company Philips in North America in late 1991 and Europe in early 1992, which was discontinued in 1996 with support for the system dropped entirely in 1998. CD-i is an acronym for compact disc interactive. It was designed to offer more functionality than a standard CD player while being less expensive than a personal computer; as such, video games were not the focal point of the system's marketing. As a result, the system was well equipped as a media and entertainment hub but was underpowered as a gaming console compared to competitors. Playback of CD-i movies required the use of a digital video cartridge (DVC) that needed to be purchased and inserted into the system separately. Later models eventually integrated the DVC into the system itself.

The Philips CD-i had a number of different models with different specifications and price points to address this. Cheaper models were intended for consumer use, and higher-priced models with more features were intended for professional use; these were separated into the 200 series, 300 series, 400 series, and 600 series. The 200 series (205, 210, and 220) were the standard home-consumer editions of the system. The 300 series (310, 350, 360, and 370) were portable versions of the system, which featured an integrated screen and rechargeable battery. The 400 series (450, 470, and 490) were smaller, cheaper models intended for educational purposes, such as classroom use. The 500 series models were the same as the 400 series but with an integrated DVC. Finally, the 600 series (600, 601, 602, 604, 605, 615, and 670) were the larger, more expensive models aimed at professional settings, with support for computer-based additions such as keyboards and floppy disk drives.

The Philips CD-i originated in a deal between Philips and Nintendo to develop a disc-based add-on for the Super Nintendo Entertainment System (SNES). The Philips CD-i also famously featured game franchises licensed, but not produced, by Nintendo. Licenses were granted to Philips in exchange for its help in developing a CD-based console of its own after the Nintendo-PlayStation deal fell through. While the *Zelda* games on the CD-i received mixed reviews at the time of their release, they have a poor reputation with contemporary fans. *Zelda* series producer Eji Aonuma considers the *Zelda* CD-i games to be noncanon.

There were hundreds of officially released titles for the Philips CD-i across a range of genres and styles. A number of interactive encyclopedias and other learning applications were available for the system in addition to games.

The CD-i was able to play CD video files, and a number of full-motion video (FMV) games took advantage of this, such as *Mad Dog McCree* (1990), *The 7th Guest* (1993), and ports of the laserdisc arcade games *Dragon's Lair* (1983) and *Space Ace* (1983).

In the late 2000s, interest in the Philips CD-i was revived due to cutscenes from CD-i games being used heavily in "YouTube Poop" (Burgess and Green 2018) videos on the video-sharing website YouTube. YTP videos are edits of existing media remixed to be surreal and stranger than the original source material. Animated cutscenes from *Zelda: The Wand of Gamelon* (1993), *Link: The Faces of Evil* (1993) and *Hotel Mario* (1994) were among the favorite CD-i sources for YTP creators. While the intention of the videos was to mock the absurdity of the cutscenes, they also led to renewed interest in the system and games.

The CD-i system was ultimately a commercial and critical failure, reportedly losing Philips $1 billion across its life cycle before being discontinued in 1996.

Rhys Jones

See also: Generations of Technology

Further Reading

Burgess, Jean, and Joshua Green. *YouTube: Online Video and Participatory Culture*. Cambridge, UK: Polity Press, 2018.

"The Design of CD-I: Incorporating Instructional Design Principles." ISSN: 0013-1962. *Educational Technology* 35, no. 2 (1995): 36–43.

"Philips' CD-I Disc Slips into Market." *Computerworld* 24, no. 30 (July 23, 1990): 17.

Philips Interactive Media Systems. *Introducing Cd-I: The Official Guide to Compact Disc-Interactive from Philips Interactive Media Systems*. Boston, MA: Addison-Wesley, 1992.

Philosophical Critique of Games. *See* Games, Philosophical Critique of

Physical Health. *See* Health (Physical)

Pinball. *See* Electromechanical Games

Piracy in China

As the largest producer and consumer of pirated video games in the world, China is facing a serious problem in game piracy. Since the introduction of video gaming to China in the 1980s, China has been a land of game piracy for almost three decades; from the Nintendo Famicom to the Nintendo Wii and the Sony PlayStation 4 and from Game & Watch to Nintendo Switch, the condition remains unchanged. Piracy has dominated the home console game market, home computer game market, and the handheld game market. Foreign game manufacturers have great difficulties launching licensed games in China because of piracy and state censorship.

Game piracy in China exists in various forms, and it penetrates nearly all game platforms and genres, except online games and arcade games. There are four major forms of game piracy in China: software piracy, hardware piracy, digital piracy, and game plagiarism.

Pirated game software made and marketed in China, either in CD-ROM or cartridge format, is always in strong demand because of its low price. The majority of players in China have never purchased licensed games; they use their home consoles or handheld consoles to play pirated software. Sometimes a chip has to be installed in a console to play pirated software. When a customer buys a game console, the shopkeeper will usually insert the chip for free. In recent years, digital piracy has become very common. Players can download a large number of games from certain websites or links for a small fee or for free.

Pirated game hardware and emulators enable players to play games without purchasing licensed game consoles. China used to make pirated game consoles; for instance, in the heyday of the Nintendo Famicom, many unlicensed Famicom-compatible machines were manufactured in China, and some even publicly advertised on television. Today, China is not making unlicensed new-generation game consoles, such as Xbox One, PlayStation 4, and PlayStation Vita, for technological reasons. Another reason is that there are many game emulator programs for people to download for free on the internet. People install the programs so that they can use their computer or handheld console to play games originally developed for other platforms.

Digital piracy, in place of software piracy, has become the most popular form of game piracy in China. There are many websites in China where people can download games for free. Many have impressive collections of games, and one can find hundreds of titles, old or new, imported or locally made. There are also unlicensed servers where people can play online games.

The plagiarism of game consoles and software is nothing new in China. In particular, the console design is most vulnerable to plagiarism. For instance, the Vii and the PXP800 look exactly like the Wii and the PSP, although they cannot play games designed for the Wii and the PSP. In addition, many Chinese games borrow the character design, story, or system from foreign games. For example, the first *Saint Seiya* online game was actually developed by a Chinese manufacturer without acquiring the copyright from Japan.

The prevalence of game piracy in China was at first caused by the gap between the price of licensed software and the purchasing ability of the people. A set of licensed game software may cost more than RMB 100 (USD 14.60), but a pirated edition costs only a few renminbi. However, following the rise of the standard of living among people in China, the price of licensed game software is no longer unreachable. Yet, the problem of game piracy remains as serious as before. It is because licensed software can hardly survive in the piracy-plagued market, and as a result, many games are not available as legal, licensed software. Consumers are also so used to having a “free lunch” that they are not willing to buy licensed software. Also, Chinese authorities, regardless of the establishment of antipiracy regulations and agencies, have not been determined enough to crack down on game piracy.

The piracy problem has forced foreign game makers to refrain from entering the Chinese market, undermining the reputation of China in international trade and giving rise to online gaming, which is relatively piracy-free.

Benjamin Wai-ming Ng

See also: China; Hong Kong; Japan; South Korea; Thailand

Further Reading

Liao, Sara X. T. "Japanese Console Game Popularization in China: Governance, Copycats and Gamers." *Games and Culture* 11, no. 3 (2016): 275–297.

Mertha, Andrew. *Politics of Piracy: Intellectual Property in Contemporary China*. Ithaca, NY: Cornell University Press, 2005.

Ng, Benjamin Wai-ming. "Video Games in Asia." In *The Video Game Explosion: A History from PONG to PlayStation and Beyond*, edited by Mark J. P. Wolf, 211–222. Westport, CT: Greenwood Press, 2007.

Platforms

Broadly speaking, a *platform* is anything built that makes it easier to build other things. "A platform in its purest form," writes Bogost and Montfort, "is an abstraction, simply a standard or specification" (2007, 2). In the digital realm, "a platform is a computing system of any sort upon which further computing development can be done" (Bogost and Monfort 2009, 2). Platforms can be implemented as hardware or software, but they often involve both building on each other in layers. Platform studies, an emerging discipline in computation, examines the architecture that enables the "creative works that have been produced on those platforms" (Bogost and Monfort 2007, 176).

Unlike Atari's *Home PONG* (1975), which was specifically designed to play a single game, the Atari VCS 2600 was constructed to enable developers to write software on interchangeable cartridges that could be executed by the hardware. Understanding this hardware—the 6507 processor, the Television Interface Adapter (TIA), ROM cartridges, and 8-pin controllers—reveals the constraints game programmers worked within when designing games. Because the VCS had no frame buffer for storing video display information, developers had to write carefully timed code that would execute synchronously with the television's electron beam. Familiarity with the hardware limitations of the VCS graphical display is central to understanding how sprites are drawn and updated, the rectangular shape of the "pixels" on the screen, and the number of processes that could be executed as a CRT television's electron beam raced across the screen (Bogost and Monfort 2009, 28).

The hardware capabilities of the Nintendo Wii's motion controller are another kind of platform. The Wii controller uses gyroscopes, accelerometers, and infrared receivers to accept user input. The gyroscopes and accelerometers measure rotational movement and acceleration along the controller's major axes while the infrared sensor maps the position relative to the television as a cursor on-screen. The Wii could not interpret complex gestures, so games designed for the hardware could not implement subtle motion. Instead, games were designed to account for the limitations of the hardware. Swinging a racket, golf club, or baseball bat in *Wii Sports* (2006) does not need to map one-to-one with the physical motion of the player because the game does not require that level of fidelity.

Software is equally important to the study of platforms. Software platforms include programming languages, such as BASIC and C++; operating systems, such as Microsoft Windows and Mac OS X; multimedia platforms, such as Adobe Flash; and game graphics and physics engines, such as Valve's Source and Epic Game's Unreal Engine. Software platform studies differ from software studies or code studies in that the latter examines how the software was written rather than how others can use it (Bogost and Monfort 2009, 147).

Platform studies is positioned by Montfort and Bogost as the lowest level of five tiers of digital media studies. Each level dives deeper into the object of study as the critical lens moves down through the reception and operation by the user, the interface between the user and object, the form and function of the processes and rules that govern the computational artifact, the code written to instantiate those processes, and the platforms that enable that code to run (Bogost and Monfort 2009, 146). All of these are situated in the culture and context that informs decisions made at every level.

Bobby Schweizer

See also: Generations of Technology

Further Reading

Altice, Nathan. *I AM ERROR: The Nintendo Family Computer/Entertainment System Platform*. Cambridge, MA: MIT Press, 2015.

Bogost, Ian, and Nick Montfort. "New Media as Material Constraint: An Introduction to Platform Studies." In *Electronic Techtonics: Thinking at the Interface*, Proceedings of 1st International HASTAC Conference, 176–192. Duke University, Durham, NC, April 19–21, 2007.

Bogost, Ian, and Nick Montfort. "Platform Studies: Frequently Questioned Answers." In *After Media: Embodiment and Context*. Proceedings of the Digital Art and Culture Conference, 2. UC Irvine, Irvine, CA, USA, December 12–15, 2009.

Play

Play scholar Brian Sutton-Smith claims that the task of defining play is "difficult, if not impossible," given how vast the concept is (1997, 217). He extends this warning by stating, "We all know what playing feels like," but "when it comes to making theoretical statements about what play is, we fall into silliness."

The concept of *play* goes hand in hand with *game*, and it is hard to imagine defining one without the other. Yet, major efforts—notably Juul's (2005)—have focused the attention more on defining *game* rather than *play*. This seems reasonable, as games feel more concrete and specific than the multiple activities involved in play. Still, the challenge of better understanding the latter remains.

Defining *play* can be difficult for several reasons. One is context: the same activity could be perceived as *play* or not depending on the player's intentions. For example, I could enjoy solving cypher puzzles. However, if I were a spy, that same activity could be so serious that my life could depend on it. To make things even more complicated, a professional spy can spend his or her time solving puzzles either for fun or as training—or perhaps both at the same time.

And then we have the language problem. Whereas English makes the distinction between *play* and *game*, most Roman languages do not. However, the English language is not extremely precise either: both terms can be used as a noun or a verb. To make things even more difficult, we also love to use these terms metaphorically in everyday talk.

Salen and Zimmerman describe this duality by pointing out that "games are a subset of play," and "play is an element of games" (2003, 303). In the first case, play is seen as a set of activities, whereas, in the second, it is seen as an object, a characteristic of games.

Several non-English-writing scholars have felt the need to differentiate between two different categories for describing play, even though we should be careful not to assume that they were describing the difference between *play* and *game*. For example, French philosopher André Lalande differentiated between two kinds of *jeu*, describing one of them as a subset of the other, organized through victories and defeats, gains and losses. French scholar Roger Caillois (1961) also introduced two terms, *paidia* and *ludus*, as two extremes of a continuum where he located *jeux* (French for "games" and "play activities").

So when reviewing a definition of *play* by a non-English-writing scholar, we have to pay special attention to how the work has been translated. One of the most famous definitions is that of Johan Huizinga; in his *Homo Ludens* (1938), he offers two definitions of *play*. Here is the broader one:

> Play [is] a free activity standing quite consciously outside "ordinary" life as being "not serious," but at the same time absorbing the player intensely and utterly. It is an activity connected with no material interest, and no profit can be gained by it. It proceeds within its own proper boundaries of time and space according to fixed rules and in an orderly manner. It promotes the formation of social groupings which tend to surround themselves with secrecy and to stress their difference from the common world by disguise or other means. (Huizinga 1938, 13)

As Salen and Zimmerman point out (2003, 75), Huizinga's definition does not differentiate between *play* and *game* and has been heavily criticized in the recent decades for being vague and too broad (Frasca 1997; Juul 2005). The other classic definition is that of Roger Caillois, who describes *jeu* (was he referring to *play*, *game*, or both?) based on six main characteristics: free, separate, uncertain, unproductive, governed by rules, and involving make-believe.

A common trend in many studies on *play* and *games* is the idea that play activities do not involve rules or at least involve less strict rules than games. The problem here may be how we understand the concept of *rule*. Rules are generally understood as social rules that give value to a certain action: "If you steal, you will go to jail," or "If you score more goals than your opponent, you will win."

However, not all rules are prescriptive. Some simply describe the inner workings of something or what is possible within a system. For example, imagine a maraca: a sealed container with small objects inside. The governing law of the maracas is that they emit sounds depending on how they are moved. A toddler can play the maracas according to a basic set of rules: if the maraca is still, there is no sound. If I shake the maraca slowly, there is a soft sound. If I shake it hard, the sound is louder. My maraca playing will be constrained by these rules. These are not, however, prescriptive social rules. If I am playing my maracas in a music band, then there is a clear social rule: I must follow the rhythm or I will be perceived as a lousy musician. Rather than saying that games have rules and play does not, it may be better to understand that there are different kinds of rules. For example, Piaget made the difference between *rules* that are understood as social agreements and *regularities* that influence play in presocialized children.

Elliot Avedon and Brian Sutton-Smith first defined *play* as “an exercise of voluntary control systems” (1971). This was later expanded by Sutton-Smith in his *Ambiguity of Play*, where he writes, “Psychologically, I define play as a virtual simulation characterized by staged contingencies of variation, with opportunities for control engendered by either mastery or further chaos” (1997, 231)

Salen and Zimmerman defined *play* as “free movement within a more rigid structure” (2003, 304). This is an elegant definition that can be particularly useful for designers to visualize the ambiguity between freedom and constraints that play imposes on players.

In my own definition of *play*, I have attempted to look further into the player’s mindset while focusing on its subjective nature: “Play is for somebody an engaging activity in which the player believes she has active participation and interprets it as constraining her immediate future to a set of probable scenarios, all of which she is willing to tolerate” (Frasca 2007). The key words here are *every* and *tolerate*: players will not enjoy all consequences of their play actions, but at least they are willing to cope with them.

Near the end of the *Ambiguity of Play*, Sutton-Smith provides a metadefinition: a list of requirements that he thinks a good definition of *play* must include. These are summarized as follows:

> Play’s definition must be broad rather than narrow. . . .
> . . . It should apply to animals as well as humans, and children as well as adults.
> [Play] should not be defined only in terms of the restricted modern Western values that say that it is nonproductive, rational, voluntary, and fun. . . .
> . . . Play is not just an attitude or an experience; it is always characterized by its own distinct performances and stylizations.
> Play can be very narrow or very broad, both in spatial and temporal terms.
> . . . Play is like language: a system of communication and expression. . . . (Sutton-Smith 1997, 218–219)

The fact that one of the most ambitious modern treatises on play finishes not with a clear-cut definition but rather with a blueprint for one is quite telling on how difficult the task of understanding play is.

Gonzalo Frasca

See also: Caillois, Roger; Huizinga, Johan

Further Reading

Avedon, E. M., and Brian Sutton-Smith. *The Study of Games*. New York: John Wiley & Sons, 1971.

Caillois, Roger. *Man, Play, and Games*. Translated by Meyer Barash. New York: Free Press of Glencoe, 1961.

Frasca, Gonzalo. "Play the Message: Play, Game and Videogame Rhetoric." IT University of Copenhagen, Unpublished manuscript, 2007.

Frasca, Gonzalo. *El videojuego como medio para una ficción interactiva: Notas para una poética del joystick*. Montevideo, Uruguay: Universidad Catolica del Uruguay, 1997.

Huizinga, Johan. *Homo Ludens*. Boston, MA: Beacon Press, 1950 [1938].

Juul, Jesper. *Half-Real: Video Games between Real Rules and Fictional Worlds*. Cambridge, MA: MIT Press, 2005.

Piaget, Jean. *Play, Dreams, & Imitation in Childhood*. New York: W. W. Norton and Company, Inc., 1962.

Salen, Katie, and Eric Zimmerman. *Rules of Play: Game Design Fundamentals*. Cambridge, MA: MIT Press, 2003.

Sutton-Smith, Brian. *The Ambiguity of Play*. Cambridge, MA: Harvard University Press, 1997.

Play Meter Magazine

Play Meter magazine was a trade publication covering the coin-operated entertainment industry. Founded in 1974 by Ralph C. Lally II, *Play Meter* published monthly until 2018. The magazine offered news coverage at the regional, national, and international levels as well as tournament and league news, coverage of major trade shows, industry trend reports, company profiles, and family entertainment center information. *Play Meter*'s target audience consisted of members of the coin-operated amusement industry, specifically route operators and coin-op machine distributors.

Because of this industrial focus, the publication dedicated much of its space to news of specialized interest to these business sectors. The magazine offered new product descriptions and game reviews that were intended to help operators decide which games to invest in. The magazine also accepted both display and classified advertisements, many of which were focused on specific games or on specific sales or distribution outlets for games. The publication provided other information that may have been of interest to owners and operators who primarily worked with arcades or other dedicated gaming venues and included extensive coverage of non-coin-operated amusements such as miniature golf and go-karts, among others, which are relevant to operators of family entertainment centers. *Play Meter* regularly published tax advice and other content intended to assist in the development and operation of coin-op businesses.

Play Meter included an annual directory issue that listed manufacturers, distributors, and suppliers. The magazine was primarily distributed through mail order, although issues were sometimes circulated at relevant trade shows and were routinely sent out to advertisers or other potentially interested parties. In 2010, subscriptions totaled just under three thousand, with circulation totaling just under five thousand.

In addition to its print presence, *Play Meter* regularly posted industry news in digest form on its website, which currently persists as an online archive.

Carly A. Kocurek

See also: *RePlay* Magazine

Further Reading

Play Meter magazine website. Accessed September 23, 2020. Available at http://www.playmeter.com.

Player Character. *See* Avatars

Playmore. *See* SNK (Shin Nihon Kikaku) Playmore

Playrix

Playrix, or Playrix Entertainment, was founded in 2004 by Dmitri and Igor Bukhman. The company initially provided casual PC downloadable games, and it published its games on portals such as Big Fish Games (a portal specializing in the distribution of such games). Its flagship title, *Gardenscapes* (2012), actually started out as a hidden object game for PCs. Playrix took the mobile turn in 2010; after having launched premium games, the company opted for free-to-play (F2P) games. Playrix specializes in casual titles, such as match-three puzzle games and town simulations.

The company introduces itself as one of the world's top mobile games and PC/Mac games developers, and it employs over eight hundred people across several offices in different countries. Pocketgamer.biz notes that "Playrix has become a best-in-class mobile games studio for maintaining—and, more impressively, actively improving—the profitability of its free-to-play games long after launch" (Suckley 2017). The company has released four successful mobile F2P games: *Gardenscapes* (2012), *Township* (2013), *Fishdom* (2015), and *Homescapes* (2017). These games have been in the top fifteen of the top fifty grossing games in more than fifty countries worldwide (Takahashi 2016). In late August 2016, Playrix became the first Russian publisher to be ranked globally as a top twenty game publisher by revenue (App Annie 2016). In August 2017, Playrix became the highest-grossing mobile game developer in Europe. As of March 2018, it was the fourth highest on Android and the sixth highest on iOS worldwide, improving its rankings over the previous year (Appodeal and Newzoo 2018, 11). Playrix was ranked eighth on PocketGamer.biz's Top 50 Developer 2018 list.

The company, being private, does not disclose its revenues; however, it has been reported (Harris 2018) that Playrix's match-three puzzle game *Homescapes* generated revenues of $420 million in its first year from in-app purchases, and that *Gardenscapes* recently hit the $880 million milestone.

Playrix illustrates the winning strategy of a global export-driven company building on the worldwide growth of mobile devices. As of 2018, the Russian games market was estimated by Newzoo (2018) at $1.7 billion, and the turnover of the company is likely to be close to that amount if one just adds up the sales of the two games previously mentioned. The company from Vologda chose to self-publish and localize its first hit mobile game, *Township*, into twelve languages, including Chinese, Japanese, and Korean. As stressed by App Annie (2017), "the number of successful self-publishing cases is very small," especially when addressing Asian markets; a successful approach achieved "without changing their game mechanics while exclusively relying on international ad networks."

Jean Paul Simon

See also: Russia

Further Reading

App Annie. "Playrix: EMEAR's Next Top Publisher?" 2016. Available at https://www.appannie.com/en/insights/mobile-gaming/russia-cis-baltic-region-spotlight-outpacing-global-gaming-market/.

App Annie. "Self-Publishing in Asia: Insights from Playrix." 2017. Available at https://www.appannie.com/en/insights/mobile-gaming/self-publishing-asia-insights-playrix/.

Appodeal and Newzoo. *Monetizing Casual Games: The Right Way*. 2018. Available at https://www.appodeal.com/home/static/Monetizing_Casual_Games_The_Right_Way_[ebook_by_Appodeal].pdf.

Harris, I. "Playrix's Homescapes Builds Up $420m in Revenue for First Year." 2018. Available at https://www.pocketgamer.biz/news/69199/playrixs-homescapes-builds-up-420m-in-revenue-for-first-year/.

Newzoo. *Russia Games Market 2018*. July 11, 2018. Available at https://newzoo.com/insights/infographics/russia-games-market-2018/.

Playrix website. Accessed September 23, 2020. Available at http://www.playrix.com.

PocketGamer.biz. "Top 50 Developer 2018." August 21, 2018. Available at https://www.pocketgamer.biz/list/68809/top-50-mobile-game-developers-of-2018/.

Suckley, M. "Charting the Rise of Russian Mobile Gaming Powerhouse Playrix." March 17, 2017. Available at https://www.pocketgamer.biz/the-charticle/65754/charting-the-rise-of-playrix/.

Takahashi, D. "Playrix Has Become Europe's Quiet Giant in Mobile Gaming." 2016. Available at http://venturebeat.com/2016/11/23/playrix-has-become-europes-quiet-giant-in-mobile-gaming/.

PlayStation. *See* Sony PlayStation

PlayStation 2. *See* Sony PlayStation 2

PlayStation 3. *See* Sony PlayStation 3

PlayStation 4. *See* Sony PlayStation 4

Pokémon GO

Pokémon GO (2016) represents one of Nintendo's most successful forays into the app market. It was published and developed by Niantic, a then little-known studio responsible for the augmented reality (AR) mobile game *Ingress* (2012). Since the game's release, over one billion people have downloaded it (Webster 2019).

To play, a player must create an account, often linking a Google or Facebook account in the process. The player then makes an avatar with limited customization options before being treated to a bird's-eye view of his or her location. As the player walks around the map, the avatar matches the player's location. Pokémon appear when the player draws near. Tapping the Pokémon opens a new screen in which a player can swipe the screen to throw Poké Balls at the desired target. If a Poké Ball hits the target at the correct time, the likelihood of a catch event increases. Capturing Pokémon is one means to acquire experience points. Through experience points, the character levels up, gaining more items and in-game benefits. There are a variety of items also available for purchase via real or in-game currency. Some items assist in capturing Pokémon, such as berries, while others, such as the incense, draw rare Pokémon to the player.

Another way to acquire items revolves around visiting PokéStops. A nearby player can swipe these stations, earning a small number of items and experience points. Some PokéStops have gyms in which the players can battle Pokémon left by others. These gyms function like king of the hill, with the victor gaining the right to place a Pokémon at that location for subsequent battles. Players are rewarded with in-game currency based on how long their Pokémon holds the gym before being replaced.

A notable departure from the core franchise lies in the treatment of Pokémon as an in-game resource. In the core games, players were encouraged to approach collecting like field biologists collecting samples. The catch phrase "Gotta Catch 'Em All" refers to this challenge, encouraging players to collect one of each kind of Pokémon in the game. In *Pokémon GO*, the dominant strategy is to catch every Pokémon encountered. These Pokémon can be exchanged for in-game resources.

The success of *Pokémon GO* has affected the design methods for Pokémon games for the Nintendo 3DS and Switch consoles as well. In *Pokémon Ultra Sun and Ultra Moon* (2017), the interface was streamlined, moving it closer to *Pokémon GO*. A concerted effort to combine elements of the app into the console series appears in the design of *Pokémon: Let's Go, Pikachu!* (2018) and *Let's Go, Eevee!* (2018), including using the app's catching mechanics and allowing for trades between *Pokémon Go* and *Pokémon Let's Go* accounts (Webster 2019).

Characters from the augmented reality game *Pokémon GO*. (Mariayunira/Dreamstime.com)

According to the review aggregator Metacritic, the critical response remains fairly mixed. Many reviewers found the gameplay shallow and cited numerous technical difficulties, at times rendering the game unplayable. Despite lukewarm reviews, the game exploded to the top of the app store within the first week of release (July 6, 2016). Usage peaked around July 15, and by September of that year, the game had hemorrhaged 79 percent of its players (Thier 2016). As of May 2018, *Pokémon GO* had 147 million active players, providing a monthly revenue of $104 million (Phillips 2018). The staggering financial success of the game has renewed interest in the commercial potential of AR games and apps.

Colin Wheeler

See also: Nintendo

Further Reading

Phillips, Tom. "Pokémon Go Active Player Count Highest since 2016 Summer Launch." Eurogamer, June 27, 2018. Available at http://www.eurogamer.net/articles/2018-06-27-pokemon-go-player-count-at-highest-since-2016-summer-launch.

Thier, Dave. "'Pokémon GO' Has Lost 79% of Its Paying Players since Launch, but That's Fine." *Forbes*, September 15, 2016. Available at http://www.forbes.com/

sites/davidthier/2016/09/13/pokemon-go-has-lost-79-of-its-paying-players-since-launch-but-thats-fine/#475dc0e77b4b.

Webster, Andrew. "Pokémon Go Spurred an Amazing Era That Continues with Sword and Shield." The Verge, February 28, 2019. Available at http://www.theverge.com/2019/2/28/18243332/pokémon-go-sword-shield-franchise-history-niantic-nintendo-switch.

Poland

The early days of gaming in Poland were conditioned by the digital isolation of the Communist Eastern Bloc. Western companies were banned from selling new technologies to the East because of the possibility of their military application (Budziszewski 2015). This resulted in a technological delay, as products introduced to the Polish market had to be obsolete from the Western point of view. Private importers were facing harsh exchange rates between the Polish złoty and Western currencies. For Polish citizens to be able to buy a computer or a gaming console in the West, the machine had to be old enough to be sold for a fraction of its original retail price. This continued in the 1990s, even after the removal of the ban, as the purchasing power of Polish society rose slowly. The result of this was a unique situation in which the country repeated the history of computing in an accelerated fashion, with new machines becoming dominant on the market roughly every two years.

The price factor was the main reason for the limited popularity of gaming consoles. Computers were perceived as universal tools suitable for education, and the purchase of dedicated gaming machines was seen as a luxury. The prices of console games constituted an unsurmountable barrier for Polish players until the 2000s. In the 1980s, software piracy was practically the only way to obtain new games. Piracy was not perceived as problematic because the law did not regulate intellectual property of digital goods until 1994. Cartridges used in most of the popular consoles of the time could not be pirated without manufacturing technologies, and these were unavailable in Poland. For this reason, the first console to reach a mass audience was the Pegasus (a Chinese Famicom clone), which was sold with cartridges containing multiple NES and Famicom games (as well as ROM hacks). Mirroring the digital delay characteristic for the introduction of computers, the 8-bit Pegasus debuted on the Polish market in 1992, when the West moved toward 16-bit consoles. The significance of piracy can be seen in that the next console to gain popularity—one that fully established the console market in the country—was the Sony PlayStation, which was very easy to modify so that it could play pirated CDs. Domestic attempts at creating a Polish console stopped after a few tries in the late 1970s and early 1980s. The most successful of these attempts was the *PONG* clone TVG-10 released in 1979. It came with a preinstalled set of games and was not programmable, typical for early *PONG*-like machines, which also solved the problem of cartridge manufacturing and distribution.

For similar reasons, the only handheld machines that gained popularity contained preinstalled games and were clones of the Nintendo Game & Watch series produced in the USSR. The lack of access to consoles and handhelds resulted in noticeable differences in gaming culture; popular characters such as Mario and Zelda could not achieve the status they had in the West.

Unlike consoles games, computer games were typically very easy to obtain. Games stored on cassette tapes could be easily replicated using quality double cassette decks. Games stored on floppy disks could be copied using dedicated software (such as *Fast Hack'em* (1985) for the Commodore 64 or *X-Copy* (1988) on the Amiga). Some of the games were even distributed using a state-owned radio broadcasting service and the popular program *Radiokomputer*. Still, the crucial nod in this distribution network can be traced back to "computer sales" (*giełdy komputerowe*). The name of this very Polish phenomenon can be misleading, as there is no good translation of the term to English (in fact, the Polish name is not accurate either). The best way to understand "sales" is to imagine them as hybrids of electronic markets, computer clubs, and demoscene copyparties. The sellers were typically young gamers who sold the games to sustain their hobby. They often swapped new games and played them during the sale. The games were typically sold in bulk, with one tape containing more than a dozen titles.

The fact that in the pre-internet era people had to communicate personally to copy games resulted in an emergence of a strong social network that formed the backbone of a big part of the Polish game development scene. For example, the roots of two of the most successful companies, Metropolis Software and CD Projekt, can be traced back to "computer sales."

One of the important results of the digital isolation of the Eastern Bloc was a lack of computer literacy among Poles. Good documentation, manuals, and computer programming books were hard to find. Importing literature from the West was problematic because of the price and the language barrier. The situation started to change slowly thanks to the domestic market of computer magazines, such as *IKS* (1986–89) and especially *Bajtek* (1985–96), which played a formative role for Polish developers. Long game listings written in different dialects of BASIC could be found on many pages of these magazines. In many cases, they were reprints or modifications of similar listings printed in Western magazines, but the magazines sometimes printed original work (Kluska and Rozwadowski 2011).

Apart from listings, the magazines also contained walkthroughs of games (often accompanied by big hand-drawn maps) and a small number of reviews. In 1991, the first magazine dedicated to games was launched. Its name, *Top Secret*, corresponded with its content, as it mostly functioned as a repository of "secrets," such as walkthroughs, tips and tricks, and simple game hacks. Even though it was never admitted in the magazine, the editors knew that their readers used pirated software, and because of this, a standard Western form of review understood as a buying guide was superfluous. What was needed instead was the game's documentation. For this reason, the early reviews read more like parts of the missing game manuals; they often started with a short story presenting the narrative of the game and proceeded with a detailed explanation of its controls. In the late 1990s, the Polish gaming press market was at its zenith with twenty-four published gaming magazines (Kolasa 2001). Hardly any of these titles remain in circulation today, despite crowdfunded attempts at reviving them. Yet, their legacy continues with the newest gaming magazine, *Pixel* (launched in 2015), which was created by many veteran journalists of the era.

The first documented Polish games were adaptations of traditional games written for mainframes: *Noughts and Crosses* (1960) and *Marienbad* (1962), a version of Chinese logic game Nim (Kluska and Rozwadowski 2011). The next significant wave of games appeared in the 1980s, coinciding with the appearance of home computing. The first Polish games came from hobbyists who did not attempt to publish their creations. Apart from the listings already mentioned, a number of simple games for the ZX81 were produced (Kluska and Rozwadowski 2011). The lack of computer literacy and the practically nonexistent legal market resulted in a relatively slow start to an organized development scene. Polish developers could not compete with their Western colleagues on the technical level, and it was also impossible to make the games competitive in terms of their price, as any game released legally had to be more expensive than pirated products.

An ideal solution was to try to sell games directly to the West. This was not easy, as it required the creators to have good connections outside of the Iron Curtain as well as the skills and tools needed for competitive development. The earliest example of this strategy can be found in *Web Master* (1983), an arcade game created for the 8-bit Atari computers. It was commissioned by a Polish emigrant living in the United States, but, sadly, it was never released. A number of games were created by California Dreams, a company created by another Polish emigrant, Lucjan D. Wencel. The company published a number of fairly successful games released in 1989 for various platforms, such as *Blockout* (a three-dimensional variation of *Tetris* [1984] released for the Amiga, Atari ST, Commodore 64, and PC), *Street Rod* (a racing game released for the Amiga, Commodore 64, and the PC), and *Tunnels of Armageddon* (a pseudo three-dimensional shooting game released for the Amiga, Apple IIGS, and PC). The last of the company's games was *Solidarnos´c´* (1991), a strategy game depicting the fight between the famous trade union and the Communist state. The game was finished but never officially released because it was originally planned as a tie-in for a movie about Lech Wałęsa that was never made (Warner Bros. bought the rights but never proceeded with the project). The game leaked and can be played today with DosBox.

The typical strategy employed by Polish developers was to focus on niches neglected by the West. The most obvious one was the lack of games available in the Polish language. This was especially problematic in the case of text adventures, which demanded fairly good command of English. For this reason, the genre became one of the most popular to be developed locally. The first commercially published Polish game, *Puszka Pandory* (*Pandora's Box*), released for the ZX Spectrum in 1986, was quickly followed by a series of other successful text adventures, such as *Hibernatus* (1987), *Conan* (1987), and *Mózgprocesor* (1989), the latter of which was later ported to 8-bit Atari computers. Another important niche for Polish games was educational software, with games such as *Hexana* (1987) and *Podróż po Polsce* (1987) teaching players mathematics and geography, respectively.

The first wave of ZX Spectrum games passed relatively quickly, as most of the users started to move toward a more advanced platform, the 8-bit Atari computers. The year 1989 saw the release of *Robbo*, a cross between *Boulder Dash*

(1984) and *Sokoban* (1982), which remains popular to this day due to the level editor released later. The situation of the 8-bit Atari computer in Poland was unique in that when it became a dominant platform in 1990, there was practically no longer any software produced for it in the West. This created a niche Polish developers needed. Between 1989 and 1994, a number of very successful games were produced for the platform, and many of them, such as *Misja* (1990), *Miecze Valdgira* (1991), and *Magia Kryształu* (1992), were hybrids of adventure games and platform games, similar to Codemasters' *Dizzy* series of the 1980s and 1990s. Others, such as *Fred* (1991) and *Operation Blood* (1992), belonged to genres that Atari 8-bit computer software lacked: platformers and rail shooters, respectively. Another strategy was to produce unlicensed games based on popular Polish movies or TV shows, such as *AD 2044* (1991), *Hans Kloss* (1992), and *Janosik* (1994). Despite piracy, the demand for new Atari games was so great that game publishing became a sustainable business.

Between 1992 and 1994, the Commodore 64 (C64) dominated the market, but the need for locally produced games was smaller due to the existence of software produced abroad. Still, a number of successful C64 platformers, such as *Lazarus* (1994), *Slaterman* (1994) and *Eternal* (1995), were released.

The period between 1994 and 1996 belonged to the Commodore Amiga. Similar to the 8-bit Atari computer, Polish development for the Amiga exploded when the number of games released in the West decreased. Many of these games were written in AMOS, a fairly powerful variation of BASIC that democratized game development and enabled amateur programmers to create competitive games without needing advanced technical skills. Many Amiga games tried to tap into themes neglected by Western developers; they were either adventures written in Polish (e.g., *Mentor* [1994], *Misja Harolda* [1995], *Kajko i Kokosz* [1995], and *Alfabet Śmierci* [1996]) or action games set in a recognizable domestic setting (e.g., *Franko* [1994], *Doman* [1995], and *Ubek* [1995]).

Another important influence on Amiga developers was the rise of the PC as a gaming platform. Skilled Polish developers (who often originated from demoscenes) attempted to recreate new PC genres that had limited presence on the Amiga. The effect of this was a number of attempts at creating three-dimensional shooting games (e.g., *Za żelazną bramą* [1995], *Project Battlefield* [1995], *Cytadela* [1995]); real-time strategy (RTS) games (e.g., *Exodus: The Last War* [2000]); *Heroes of Might and Magic: A Strategic Quest* (1995) derivatives (e.g., *Legion* [1996]); and even FMV games (e.g., *Zdzisław: Heroes of the Galaxy 3D* [1997]).

Around 1996, developing games for the Amiga became unprofitable as the market moved toward PC gaming. Early attempts at PC development (e.g., *Electro Body* [1992]) tried to exploit another niche, the lack of PC platformers, but around 1996, when PC became the dominant platform (which is still the case today), the number of exploitable niches decreased.

The PC was a healthy platform with a steady stream of new games from the West. Many games were localized, so the advantage of using the Polish language was lost. Local developers had only two possibilities: to "chase the West" and create games that were competitive or to sell games cheaply. The latter choice has been exploited by City Interactive, which developed a significant number of low-budget shooters, such as *Wing of Honor* (2003) and *Terrorist Takedown* (2004). The first company that embraced the ethos of "chasing the West" was Metropolis Software, with adventure games such as *Teenagent* (1995) and *Książe i Tchórz* (1996). This was quickly followed by other developers (e.g., Detalion), who made a series of attempts at creating successful *Myst* (1993) clones, such as *Reah: Face the Unknown* (1998) and *Schism* (2001).

The breakthrough moment came with Metropolis Software's *Painkiller* (2004), a three-dimensional shooter very well received globally. Soon after, a number of developers from Metropolis created a new company, People Can Fly, which entered a partnership with Epic Games and created the PC port of *Gears of War* (2007) and followed it with *Bulletstorm* (2011). After being acquired by Epic Games and renamed Epic Games Poland, the company released *Gears of War: Judgement* (2013) and co-created the worldwide phenomenon *Fortnite* (2017).

Another company with global success, Techland, produced the *Call of Juarez* series (2005–13) of Wild West shooters and *Dead Island* (2011), which was quickly followed by a spiritual successor, *Dying Light* (2015).

Last but not least, a newly created subsidiary of game publisher CD Projekt developed *The Witcher* series (2007–15), three increasingly well-received three-dimensional action role-playing games (RPGs) based on the Polish fantasy novels by Andrzej Sapkowski.

The rise of the indie (independent) games scene came with new opportunities. Freed from the constraints of the need to chase the West on the technological level and open to self-publishing, developers could create very different games that did not have to fill any particular niche. Arguably, the first game belonging to this category is *Soldat* (2002), a 2-D multiplayer shooter that continues to receive new levels to this day. More contemporary examples include *Zombie Driver* (2009), *This War of Mine* (2014), *The Vanishing of Ethan Carter* (2014), *Superhot* (2016), *Darkwood* (2017), *Observer* (2017), *House Flipper* (2018), and a big number of hidden object puzzle adventure (HOPA) games created by Artifex Mundi.

Paweł Grabarczyk

See also: Europe (Central and Eastern)

Further Reading

Budziszewski, P. Konrad. "Poland." In *Video Games Around the World*, edited by Mark J. P. Wolf, 399–423. Cambridge, MA: MIT Press, 2015.

Kluska, B., and M. Rozwadowski. *Bajty Polskie*. Łódz´, Poland: Samizdat Orka, 2011.

Kolasa, W. M. "Prasa komputerowa w Polsce—Historia i statystyka." *Annales Academiae Paedagogicae Cracoviensis*, Folia 2, Studia Ad Bibliothecarum Scientiam Pertinentia I, 2001.

PONG

The ball-and-paddle game *PONG* (1972) is considered the video arcade game that launched a multibillion-dollar industry and a fevered excitement for high-tech entertainment. Although not the first video arcade game, *PONG*'s design and gameplay contained a formula perfect for the ideals of casual gameplay: curiosity, intrigue, amazement, and simplicity. The *PONG* prototype was built by Allan Alcorn, Atari/Syzygy's first engineer. Nolan Bushnell instructed Alcorn to build a tennis-type game; Alcorn added the on-screen scoring, and after probing the board, found the unique *PONG* sound that he added to the game. Also, a little-known feature of the *PONG* arcade game that Alcorn added is the "hole" in the upper corners of the playfield, which were made so that a player's paddle could not fully reach to the top of each side of the playfield. This was added so that if two players were so good that they never missed a shot, the ball would eventually slip though this "hole," ensuring that the two players could not play a never-ending game, essentially keeping others from playing it, and, more importantly, to get more quarters into the machine, further increasing profits.

PONG was first introduced in a test run at Andy Capp's Tavern in Sunnyvale, California, where patrons were greeted by a small brownish-orange box placed atop a wine barrel, with only the word "PONG" on the control panel to identify this unique device. Of note, the game had an *attract screen* to draw in the patrons; the ball bounced about the screen endlessly while the game awaited a quarter to be inserted. Alcorn explained that the attract mode was purposefully designed for *PONG* to show the ball moving about the screen, but the paddles did not show so that people would not randomly play with the knobs (according to an e-mail from Alcorn to one of the authors, July 2011). Also, there was no sound during the attract mode for fear that an annoyed bar owner would pull the plug on the unit, defeating the point of its running and making money. Upon inserting a coin, *PONG* reset itself and displayed player paddles on the left and right sides as well as a score display.

The oft told story of the "broken *PONG*" is in fact a truthful one and not just a by-product of the usual video game industry lore and marketing. Atari did in fact receive a phone call from the owner of Andy Capp's Tavern saying that the *PONG* test unit had stopped working. On the side of the orange test *PONG* was a coin mechanism that was used on commercial washing machines of the day. What had occurred, to everyone's surprise, was the type of "problem" desired for every newly tested product: the coin mechanism was jammed because it was completely filled with quarters.

People playing PONG during Games Week

People playing PONG during Games Week 2014, in Milan, Italy. (Tixtis/Dreamstime.com)

After this initial test, Alcorn and Atari cofounder Ted Dabney went on to hand build ten *PONG* boards to be installed in the full-sized and now-familiar yellow *PONG* cabinets that were also placed at various locations for testing. After the profit results started to come in, Bushnell and Dabney faced a serious problem. They thought no one at Bally, the company they were actually contracted to deliver a video game to, would believe the profit results. They were just too good for such a new and unproven technology, especially compared with what new pinball and electromechanical games normally made at the time. When it was time to report to Bally, Bushnell and Dabney lowered the profit results by 25 percent per location, but Bally still responded that the results were not believable —they were just too high.

Bushnell and Dabney were then faced with another dilemma. They saw that *PONG* was making money, a lot more than anticipated. So they had to consider changing their focus from entertainment engineering to becoming a video game manufacturer. If they were going to do this, however, they would need to convince Bally that it did not want *PONG*. Atari's contract with Bally was to deliver a game to them—any game—so Bushnell and Dabney worked on a letter to send to Bally saying that *PONG* was not a viable game design and that Atari would deliver a different game to them in its place. Bally accepted the change of game design freely, and Bushnell and Dabney proceeded to go it alone and produce *PONG* machines directly.

PONG machines arrived at locations in all shapes and sizes, from the most well-known upright, yellow-faced cabinet to a cocktail table version. There were *PONG*s housed in used wine barrels, and there was even an experiment in putting *PONG*s into a doghouse-shaped cabinet with a familiar cartoon beagle sleeping on top. In total, 38,000 *PONG* machines (including follow-ups such as *PONG Doubles* [1973] and *Quadrapong* [1974]) were produced and sold to arcades, until 1975, when *PONG* went home—to the living room, that is. The invasion of people's television sets would start a new chapter in Atari's history as the arcade game company began its entry into the consumer arena.

Curt Vendel and Martin "Retro Rogue" Goldberg

See also: Arcade Games; Ball-and-Paddle Games

Further Reading

Atari Museum. "ATARI Coin-Op/Arcade Systems 1970–1974." Accessed September 23, 2020. Available at http://www.atarimuseum.com/videogames/arcade/arcade70.html.

Portal Series

Valve's *Portal* (2007) is a single-player first-person shooting game, puzzle game, and platformer. The game's protagonist, Chell (modeled after actress Alésia Glidewell), is a test subject for the Aperture Science Handheld Portal Device, a gun that can place a portal on some solid surfaces, allowing nonadjacent spaces to be linked together. Chell's guide to the experimental process, a robot named

GLaDOS (Genetic Lifeform and Disk Operating System, voiced by Ellen McLain), begins by helping the player navigate the increasingly dangerous environments of the game, becoming less helpful and more menacing as the player completes more puzzles. The player's increasing proficiency with the portal gun and growing suspicion of GLaDOS's intentions reaches a climax when Chell must destroy GLaDOS to escape the testing facility.

Portal began development after Valve was impressed by *Narbacular Drop* (2005), a senior project by students from the DigiPen Institute of Technology. Gabe Newell, the managing director of Valve, hired the entire team to expand the game's central portal mechanic for a new project at the company. The *Seattle Times* called the developers' journey from students to developers a "Cinderella tale," crediting Newell's scouting of new talent as the key to Valve's innovative new releases (Dudley 2011). Kim Swift, the producer of *Narbacular Drop*, became the lead designer for *Portal*. Writers Erik Wolpaw and Chet Faliszek were also hired for the game (Edge Staff 2008).

Although the interface of *Portal* is similar to most first-person shooting games, with the player maneuvering the player character's viewpoint and gun, *Portal*'s gameplay centers around spatial problem-solving rather than fast-paced combat. Patrick LeMieux and Stephanie Boluk suggest a new genre label for *Portal* and other games that "feature the manipulation of space and time as their main gameplay mechanic," calling them "eccentric games" (LeMieux and Boluk 2009). Each stage of the game requires the player to use the ability to create portals to successfully navigate a perilous three-dimensional environment. The Handheld Portal Device can be used to enter unreachable rooms and move objects from place to place, but the conservation of momentum between portals also leads to the player using portals to launch himself or herself around the space. Although the device does not shoot bullets, it can transfer bullets from place to place, and shooting a portal under an enemy may destabilize it, causing it to malfunction. In *Portal 2* (2011), the device is also used to move lasers (Thermal Discouragement Beams), platforms and passageways (the Hard Light Bridge and Excursion Funnel), and gels (propulsion, repulsion, conversion, and cleansing) that change the properties of surfaces.

Earlier stages in each game allow the player to explore less dangerous and challenging rooms, whereas later stages feature deadly liquid, robots shooting at the player, and other obstacles. In *Portal*, early stages take place in a clinical, featureless setting, with tiles and signs serving as guides. Later in the game, the player must sneak around behind the scenes, using the mechanics the player has learned against the facility itself. Nicolas Schiller argues that *Portal* serves as a model for successful pedagogy because of the way the increasing difficulty of its levels, and the decreasing guidance offered by GLaDOS over the course of the game, teaches the player how to use the portal gun and navigate the space of the game while playing (Schiller 2008).

Portal is one of the few first-person shooters with a female protagonist. As Chell's character model was based on Alésia Glidewell, who is of Brazilian American and Japanese descent, the protagonist may be interpreted as a woman of color with multiracial European and Asian or South Asian heritage. Repeated references to Aperture Science's "Bring Your Daughter to Work Day" have led to speculation that Chell may be the daughter of an employee of Aperture Science.

As in *Metroid Prime* (2002), in which the player can sometimes see Samus's face reflected in the inside of the helmet of her spacesuit, players learn they are playing as a female character through a mirror effect, looking through the portals they have created at their avatar. The visible and audible cast of *Portal* is all women, including GLaDOS and Standard Sentry Turrets, both voiced by Ellen McLain. In *Portal 2*, some male characters join the cast as foils to Chell and GLaDOS, including Wheatley—an incompetent Intelligence Dampening Sphere introduced to control GLaDOS, voiced by Stephen Merchant—and Cave Johnson (voiced by J. K. Simmons), the folksy yet sadistic founder of Aperture Science.

Lucien Soulban and Harris Orkin term *Portal* a "modern classic" of the first-person shooter genre for its simple narrative "told through text, voiceover, and song" (Soulban and Orkin 2009). The narrative song, "Still Alive," written by Jonathan Coulton, which accompanies the end credits of *Portal*, features GLaDOS taunting the player with her characteristic sarcasm, "I'm not even angry / I'm being so sincere right now / Even though you broke my heart and killed me." The phrase "the cake is a lie," written behind the walls of the facility by previous test subject Doug Rattman, became an internet meme that was popular from 2007 to 2011 (McCoral 2010).

Noting that the cake, "a girly prize made by women's labor to reward women's labor . . . is the very epitome of deception," Bo Ruberg reads *Portal* as an exercise in "too-close reading" of gender and sexuality in video games. Ruberg complicates the intimate relationships between GLaDOS, Chell, and the Weighted Companion Cube—a cube decorated with pink hearts that the player must incinerate after being told to regard it as a faithful friend in Test Chamber 17. Pin-up-style art of the Companion Cube found within the walls of the Aperture Science Testing Facility, the goading maternal attitude of GLaDOS, the robot's assertion that the facility is her own body, and the penetrative nature of portals are all elements of a connotative queer interpretation of the game (Ruberg 2019, 73–81). The contrast between the surface of Aperture Science and its pasted-together inner workings encourages the player to look for hidden meanings, even those that may seem to be "over-analyzing" (Ruberg 2019, 82).

Michael Burdan and Sean Gouglas also find deeper meaning in the game, reading *Portal* as "an algorithmic exploration of human struggle against algorithmic processes" and praising its "artistic integration of mechanic, narrative, and theme" (Burdan and Gouglas 2012). *Portal*'s criticisms of authoritarian science and Taylorist efficiency, expressed through video games' uniquely rule-based medium, incite the player to rebel against the game's own instructions, notably in Test Chamber 19, in which the player must escape incineration as part of the conclusion of testing. In this moment, the game requires the player to take life-saving action on behalf of Chell, "without knowing what the goal is" (Burdan and Gouglas 2012).

Ultimately, "design and play of [*Portal*] fully realizes and then transcends many of the core notions and tropes of video games" with its message of freedom, despite its algorithmic form (Burdan and Gouglas 2012). In this way, *Portal* demonstrates the power of video games as an art form.

Teddy Pozo

See also: Shooting Games

Further Reading

Burdan, Michael, and Sean Gouglas. "The Algorithmic Experience: *Portal* as Art." *Game Studies* 12, no. 2 (December 2012). Available at http://gamestudies.org/1202/articles/the_algorithmic_experience.

Dudley, Brier. "Backstory to Blockbuster Game 'Portal 2' Is a Real Cinderella Tale." *Seattle Times*, April 17, 2011. Available at https://www.seattletimes.com/business/backstory-to-blockbuster-game-portal-2-is-a-real-cinderella-tale/.

Edge Staff. "GDC: A *Portal* Postmortem." *Edge*, February 23, 2008. Available at https://archive.is/20120905022731/http://www.next-gen.biz/news/gdc-portal-postmortem.

LeMieux, Patrick, and Stephanie Boluk. "Eccentric Spaces and Filmic Traces: Portals in Aperture Laboratories and New York City." Paper presented at the Digital Arts and Culture Conference, Irvine, California, December 12–15, 2009.

McCoral, Greg. "The Cake Is a Lie." Know Your Meme, 2010. Available at https://knowyourmeme.com/memes/the-cake-is-a-lie.

"The Orange Box: Portal." 2009. Available at http://orange.half-life2.com/portal.html.

Ruberg, Bonnie. "Getting Too Close: *Portal*, 'Anal Rope,' and the Perils of Queer Interpretation." In *Video Games Have Always Been Queer*, 56–83. New York: NYU Press, 2019.

Schiller, Nicholas. "A Portal to Student Learning: What Instruction Librarians Can Learn from Video Game Design." *Reference Services Review* 36, no. 4 (2008): 351–365.

Soulban, Lucien, and Haris Orkin. "Writing for First-Person Shooters." In *Writing for Video Game Genres from FPS to RPG*, edited by Wendy Despain, 58. Wellesley, MA: AK Peters Ltd., 2009.

Watters, Chris. "*Portal* Review." *GameSpot*, April 28, 2008. Available at http://www.gamespot.com/pc/action/portal/review.html.

Portugal

In the 1980s, a revolution arrived from England with Sinclair microcomputers, the ZX-81 and ZX Spectrum. José Oliveira, a college computer science student, received his first ZX-81 for Christmas 1982. After having implemented a program for drawing mathematical functions—such as $y = f(x)$—Oliveira went further and decided to add a goal and points to the graphics being drawn on the screen, creating the first two Portuguese games, *Laser* (1982) and *Bala* (1982). Oliveira never thought about selling his games, but he managed to distribute them at a coffeehouse, which made him quite popular and suggested that games could become commercial products. In 1983, Marco Carrasco and Rui Tito signed a contract with the British company Wizard Software for distribution in the United Kingdom of three games written in Assembly language: *Mr. Gulp* (1984), *Defenders* (1984), and *Moon Megatron* (1984).

The year 1985 was a high point for Portuguese pop culture, in music, film, fashion, and video games, which included one of the biggest successes of the Portuguese game industry, *Paradise Café* (1985). Almost anyone who had a ZX Spectrum in Portugal in the 1980s would know the game or at least have heard of it. *Paradise Café* became famous not only for its adult themes, despite the poor quality of its gameplay, but also because one of the elements that contributed most to its success was the fact that it was based on an urban myth, which was a big topic of conversation in coffeehouses throughout the country.

During the 1990s, Portugal commemorated the five hundredth anniversary of the discoveries of Admiral Vasco da Gama and others, which meant a lot of available funding for artwork related to the theme. And in 1998, the Lisbon World Exposition (Expo '98) was held, which would also fund projects related to the oceans and national endeavors. New companies emerged in those years, launching *Aventuras da Peregrinação* (1997), dedicated to the Portuguese explorer Fernão Mendes Pinto and presenting a dramatization of his pilgrimage, and *Vasco da Gama: A Grande Viagem* (*Vasco da Gama: The Great Journey*) (1998), which provided a great multimedia experience.

The company YDreams was founded in June 2000 with the goal of moving forward in the field of new communication technologies. The game development team was small, and development was carried out on a proprietary YDreams platform; however, in 2003, the company launched the first international location-based commercial game for mobile platforms, *Undercover* (2003), a game with multiplayer abilities. Players could use their location to act, to take shelter in predefined locations, to prevent terrorist attacks, and to use the power of teleportation to travel between places on the map.

Since its inception, the Portuguese video game industry has tried to create a console game, but most of the projects created in the 1990s and 2000s remained incomplete and were never published. Portugal was able to produce a successful console game, for the PlayStation 3 (PS3), with the game *Under Siege* (2011). Completely created and produced by Seed Studios, a company based in Porto, it became one of the ten best-selling indie games in the PS3 network in 2011.

In 2011, with the world economic crisis affecting the entire country, the national audiovisual and video game content production houses collapsed. Most of the companies working in games went into bankruptcy or just gave up the business, with hundreds, maybe thousands, of highly specialized human resources leaving the country for the north of Europe and the United States. The situation only started to normalize in 2013–15; however, most of the workers did not return to the country, leaving most of the companies in a difficult position to restart. On the other hand, universities offered more undergraduate degrees, master's degrees, and specializations in the domain of games, which raised some hopes. Since then, these hopes have been fulfilled with the delivery of dozens of mobile games per year.

The Portuguese video game history is mainly characterized by the production of various highly interesting games and game technologies, but ones without international consequence. This means that throughout the past four decades, we can find highlights in every five-year period; however, these hardly relate to each other, thus failing to grow and empower a Portuguese industry in the domain of game development. This is not unlike the situation faced by the other arts in

Portugal, namely the film industry.

Nelson Zagalo

Further Reading

Santos, Pedro A., Patrícia Romeiro, Flávio Nunes, and Catarina Pinheiro. *Atlas do Setor dos Videojogos em Portugal (#1)*. Sociedade Portuguesa de Ciência dos Videojogos (SPCV), 2016.

Zagalo, Nelson. "Portugal." In *Video Games around the World*, edited by Mark J. P. Wolf, 425–437. Cambridge, MA: MIT Press, 2015.

Zagalo, Nelson. *Videojogos em Portugal: História, Tecnologia e Arte*. Lisbon, Portugal: FCA Editora, 2013.

Preservation

Preservation is a key component of collecting, organizing, and protecting video games and their cultures. The act of preservation is key to (1) understanding the video game industry and the forms of cultural expression it produces; (2) developing a comparative and historical sense of personal and shared play; (3) cataloging (for later use or the historical record) the range of provocations, prototypes, and production assets that comprise particular creative properties; (4) making accessible to others primary and secondary research materials; and (5) situating the video game medium alongside other mass media.

In the aggregate, preservation occurs in archives, which are integral to the act of preservation. Archival preservation ideally means storage with comprehensive environmental controls, a physical layout that minimizes human contact with artifacts, and a detailed use plan for the collection.

Preservation strategies and techniques are often idiosyncratic due to the superabundance and variety of video game software, hardware, and associated materials. Preservation is also highly context dependent. For example, some situations call for the preservation of mobile operating systems and devices along with the games they enable, while other situations require particular attention to the environmental conditions within the archive's physical storage space or consideration of the aesthetic and operational toll taken when artifacts are regularly used. Complicating matters further is the fact that the video game industry and its products are so mercurial. Video games have been used as test beds for copy protection schemes, localization strategies, data format and exchange protocols, and distribution channel services; the companies that pioneer such efforts disappear by the dozens every year. All of this introduces a high level of complexity to the act of preservation, and it also means that the art and science of saving video games for posterity is constantly evolving.

Video game preservation efforts tend to focus on physical materials (e.g., paper, plastic, metals, textiles, storage media) as well as the personnel and supplies that enable an assortment of protective measures (e.g., catalogers, chemists, archival folders). Less commonly discussed, though equally important, is the concept of "preservation through use," the idea that video game preservation should involve saving the experience of play as well as the material components that enable that experience. Preservation through use holds that because games enable particular kinds of play, it is necessary for that play to be integrated into the preservation enterprise. In other words, games need to be played to be preserved because, without play, a "game" is really just a piece of software. This means thinking about how to maintain games as playable, not just static, artifacts.

Fortunately, the material aspects of game preservation are fairly well understood and have been assiduously explored and tested by archivists in other arenas. Libraries, for instance, know well how to preserve print materials: use acid-free storage folders and boxes; limit exposure to light, moisture, and harmful oils/chemicals; and avoid contact with objects and pests detrimental to paper (e.g., particle board, silverfish). Preserving game instruction/technical manuals, design notebooks, and hand-drawn concept art is thus a relatively straightforward endeavor thanks to the work of print librarians and conservationists over the centuries. Game plastics and other petroleum-based materials similarly require specialized preservation techniques—care for the constituent artifacts themselves (e.g., dissipating their acidic gases via air circulation) and for adjacent objects that may be harmed by such "off-gassing," for example—and video game archivists are able to look to their counterparts in film, television, and toy preservation for guidance.

Less well understood are the techniques by which game software can be stored in usable and durable formats. The challenges associated with this type of preservation are substantial and evolving, and they involve the need to address material issues (e.g., the degradation of printed circuit boards and storage media) alongside industrial obstacles (e.g., industrial copy protection mechanisms). Moreover, the video game medium is growing more ephemeral as digital distribution is proving more affordable, secure, and convenient than physical distribution. Video game preservation, therefore, demands a transdisciplinary skill set, often with expertise in areas such materials science, computer engineering, art history, and more.

In summary, preservation represents the material, architectural, and human factors involved in the safeguarding of video games and their cultures. As such, it stands today as one of game studies' most diverse and demanding topics.

Judd Ethan Ruggill and Ken S. McAllister

See also: Archives

Further Reading

Corrado, Edward, and Heather Moulaison Sandy. *Digital Preservation for Libraries, Archives, and Museums*. Lanham, MD: Rowman & Littlefield, 2017.

Guins, Raiford. *Game After: A Cultural Study of Video Game Afterlife*. Cambridge, MA: MIT Press, 2014.

Matthew, Graham. "Preservation Training." In *Handbook of Library Training Practice and Development*, vol. 3, edited by Alan Brine, 79–104. London: Routledge, 2009.

Newman, James. "Game Over? The Past, Present and Future of Videogame Preservation." In Professorial Lecture Series 2016–17, June 7, 2017, Bath Spa University, Bath, UK. Available at https://www.bathspalive.com/researcherdevelopment/Online/default.asp?BOparam::WScontent::loadArticle::permalink=jamesnewman&BOparam::WScontent::loa

Ruggill, Judd Ethan, and Ken S. McAllister. "Computer Game Archiving and the Serious Work of Silliness." *Animation Journal* 19 (2011): 67–77.

Procedural Generation

Procedurally generated content is not created by hand but by algorithms that use numerical seeds to mathematically generate objects, which may or may not also involve randomization, depending on whether different output is desired every time a game world is generated. Procedural generation not only keeps a game fresh for players but also for the game's creators, who determine the parameters of algorithms that will automate the production of game space.

The first game with procedurally generated rooms was *Rogue* (1980), which had a series of dungeon rooms that the player wandered through, defeating monsters, collecting treasure, and looking for food. To provide variety, the rooms and the pathways connecting them were procedurally generated, and the randomized placement of monsters, treasures, and food also contributed greatly to the game's replayability. Another game dependent on randomized elements and layout was *Stellar Track* (1981) for the Atari 2600. This *Star Trek*–inspired resource management game had the player jumping from quadrant to quadrant, using phasers and photon torpedoes to destroy alien vessels. Each of the thirty-six quadrants had sixty-four sectors, creating a playing field grid of 48-by-48 positions. Each position could contain the player's ship, an enemy ship, or a star, which acted as a barrier to travel. Each game was a new challenge due to randomized content.

Randomized content was also the key to making much larger worlds than what could be fit into relatively small amounts of computer memory. The landmark space trading game *Elite* (1984) featured a universe of eight galaxies, each with 256 planets, in a program of only 22 kilobytes. Each planet's position, composition, commodity prices, and name was procedurally generated from numeric seeds fed through an algorithm. But while the starships and other objects were visible from space, one did not get a sense of exploring a more earthlike space, one with vast tracts of explorable land. This would come with the advent of fractal landscapes.

In 1975, Benoit Mandelbrot discovered fractal geometry, which involves shapes that are self-similar at different scales and generates forms similar to natural phenomena (such as fern branches and mountain ranges). Lucasfilm's *Rescue on Fractalus!* (1984) used procedurally generated fractal landscapes; geometric mountains and randomized terrain created more detailed landscapes than the low-resolution graphics were otherwise able to suggest. Fractal technology would again be used in Lucasfilm's *Koronis Rift* (1985), which featured rovers driving over fractal landscapes that were essentially mazes, and *The Eidolon*

(1985), which inverted its fractal mountains to create a mazelike cave interior. Firebird's *The Sentinel* (1986) also used simple fractal-based landscapes and boasted ten thousand levels, stored in less than 70 kilobytes, and Binary Systems' *Starflight* (1986) used fractal landscapes for its eight hundred different planets. However, early fractal landscapes could quickly grow tiresome due to their similarity. Also, terrains with varying slopes can limit accessibility, making areas impassable; it is difficult to ensure accessibility without limiting mountain heights and valley depths, which would homogenize a landscape.

THE VALUE OF HANDCRAFTED PLACES

Fractal landscapes are mathematically unique, but handcrafted locations often have specific attributes that together create a distinct personality that turn a *space* into a *place*. Spaces and activities left to procedural generation tend to be more repetitive in nature, a theme and variations of it, rather than new themes. Games using it can still be fun and replayable with more expansive universes, despite being somewhat repetitive. Mindscape's *Captive* (1990), for example, had 65,535 procedurally generated planets and bases; yet, it received 91percent approval ratings, and *Amiga Power* listed it as the thirty-first best game of all time.

With the arrival of optical disc storage in the late 1980s and early 1990s, graphics improved, and handcrafted worlds became much larger. While procedural terrain generation would continue to be used, increased storage capacity allowed more flexibility, and more detail could be stored and used, allowing more combinations of handcrafted content and procedural generation. Faster processing times allowed procedural generation to provide more detail in real time and in an increasing number of areas. The *Civilization* game series used procedurally generated maps, allowing players to choose between types of terrain. Smaller scale details changed, but the overall forms remained consistent with the chosen terrain; such variations in detail keep games fresh. But procedural generation is not appropriate for every area of a game, as such material often lacks the deliberate design one finds in material handcrafted by an author.

Combining procedurally generated content with handcrafted material can result in large worlds that have a more deliberate feel in their design, as in *Advanced Dungeons & Dragons: Slayer* (1994) and *Virtual Hydlide* (1995). *Slayer* used repeated wall, door, and window elements in a procedurally generated dungeon that filled in gradually as the dungeon was explored. The designers of *Virtual Hydlide* created over forty maps for the dungeon levels and the overworld, and these maps could be randomly selected and combined. Players would get a ten-letter seed representing a particular world, which could be reentered later. Such reusable seeds also remind us that "procedurally generated" does not always mean "randomly generated"; thus, procedural generation can function as a form of data decompression.

Some games combined various landmasses and buildings to produce procedurally generated towns. *The Elder Scrolls II: Daggerfall* (1996) had a landmass of 62,394 square miles with fifteen thousand towns. Complaints of the monotony of the world led to a much smaller (only 0.01%) but more handcrafted world for its sequel, *The Elder Scrolls III: Morrowind* (2002). Increased memory capacity helps to solve the problem of repetition in two ways: games can include more handcrafted, interchangeable elements to be used in procedural constructions, or a greater number of algorithms can be used to add parameters to randomization as well as to generate higher levels of detail.

Individual buildings and dungeons can also be generated through the recombination of handcrafted building units; games from the *Diablo* series, for example, are noted for this technique. While repetition in such designs is more evident from a top view, it may be less so from a first-person point of view, especially if the building interiors have randomized elements and décor.

ART GAMES AND THE CHALLENGE OF COMPRESSION

Memory constraints can be an artistic challenge. Programmers attempt to fit detailed worlds within small amounts of memory, relying on procedural generation and faster processing speeds to decompress data, do fractal calculations, and run algorithms. Alessandro Ghignola's *Noctis* (2000) featured a three-dimensional, texture-mapped explorable universe of billions of stars and planets, all generated by a program smaller than one megabyte. Another example is *.Kkrieger* (2004), a first-person shooting game with elaborate graphics and lighting, which takes up only 97,280 bytes of disk space, by using box modeling, an iterative process. Models and textures take hundreds of steps to create when the game is run, but the game is able to produce a world that would normally take hundreds of megabytes to store. Thus, the small amount of memory used must be made up for through processing speed.

Greater storage is also necessary for games that generate large amounts of world data. *Dwarf Fortress* (2006) generates all the terrain of its worlds, along with maps for elevation, temperature, rainfall, drainage, vegetation, and salinity. Mountains are eroded by rivers, and plant and animal populations are added as well as races of sentient beings. Weather modeling even tracks wind and humidity and creates fronts, clouds, storms, and blizzards. After the material world is built, a historical timeline is generated, with thousands of characters being born, living lives, and dying; events are recorded in a year-by-year list for every character's life, where they lived or wandered, who they fought, outcomes of conflicts, descendants, and so forth. Players can choose how much history is generated before the world is ready to enter. Like *Rogue*, graphics are two dimensional and text only, and they appear in sixteen available colors.

Generating three-dimensional terrain, the racing game *Fuel* (2009) provides players with 5,560 square miles of fully explorable terrain, the largest playable environment in a console game. The game is a good example of the graphics that procedural generation can achieve, demonstrating that beyond randomness one needs a set of parameters within which plausible objects and landscapes are generated; yet, even good graphics are not enough to make up for too much repetition of elements. And unlike the simpler worlds of space trading games, three-dimensional worlds usually must be far more interactive for the player. Games such as *Fuel* allow players to travel all over the landscape exploring, but beyond that interaction is usually rather minimal. However, more fully interactive procedurally generated worlds appeared during the 2000s.

INFINIMINER, MINECRAFT, AND BEYOND

The most popular game with a procedurally generated world, *Minecraft* (2009), was inspired by *Dwarf Fortress* (2006), *Dungeon Keeper* (1997), and especially *Infiniminer* (2009), from which *Minecraft* borrows its ideas, visual design, gameplay mechanics, and procedural generation techniques. These games move repetition to a smaller scale; their worlds are composed of variations of blocks combined in endless ways. Although the graphics of these games are simpler, the greater interactivity available outweighs the aesthetic tradeoffs for many gamers. As such, space trading and exploration games continue to evolve, with procedurally generated planets and other locations in games such as *FTL: Faster Than Light* (2012) and *Starbound* (2013) and the eighteen quintillion planets in Hello Games' *No Man's Sky* (2015). *No Man's Sky* also lets players fly down to planets and explore their lands, which are complete with flora, fauna, and geological formations.

What all these game suggest is that we are seeing a shift in which "handcrafted" does not refer to particular instances of objects and locations so much as to sets of parameters governing content generation. How such parameters are set and integrated will be the main ways that human handcrafting is combined with algorithmically constructed game assets and randomness. As artificially intelligent agents improve and the potential of story structure and world structure are explored and realized, we will likely see the quality of emergent narratives rising as well.

For games to move in the direction of procedurally generated content is quite natural when one considers how much of the complexity of the physical universe is due to procedural processes. As fractal mathematics and the study of cellular automata has demonstrated, simple rules and concepts can generate complex structures, such as a seed growing into a tree or strands of DNA guiding the development of the human body. Video game worlds grown by algorithms are increasing in their complexity, and just as players explore these worlds, their designers are exploring the nature of worlds and their representations. Although they will never reach the elegance and ingenuity of the procedural processes found in the natural world, their striving to imitate them can make us all the more appreciative of the universe around us and its combined simplicity and complexity.

Mark J. P. Wolf

See also: Art, Video Games as

Further Reading

Davies, Marsh. "Building Worlds with a Single Click." *Edge Online*, July 6, 2011: 3. Available at https://web.archive.org/web/20140228035744/http://www.edge-online.com/features/building-worlds-single-click/3/.

Parkin, Simon. "No Man's Sky: A Vast Game Crafted by Algorithms." *MIT Technology Review*, July 22, 2014. Available at https://www.technologyreview.com/2014/07/22/12940/no-mans-sky-a-vast-game-crafted-by-algorithms/.

Wolf, Mark J. P. “Combinatorial Explorations: A Brief History of Procedurally-Generated Space in Video Games.” In *Ludotopia: Spaces, Places and Territories in Computer Games*, edited by Espen Aarseth and Stephan Günzel. Bielefield, Germany: Transcript, 2019.

Procedural Rhetoric

Procedural rhetoric is a term coined by Ian Bogost to define a method of rhetoric that involves building and interacting with models rather than with words or images, “the art of persuasion through rule-based representations and interactions rather than the spoken word, writing, images, or moving pictures” (Bogost 2007). Although not limited to video games nor even to computer software, Bogost suggests games as the best medium from which to understand procedural rhetoric. Furthermore, because video games are made from computer models, he argues that procedural rhetoric is the essential meaning-making function of video games, which separates them from all other expressive media. Bogost gives the name “persuasive game” to video games that mount effective procedural rhetoric.

Procedural rhetoric combines two concepts from the history of rhetoric and of computational media. As described by Janet Murray, “procedurality” is one of the key properties of digital media, a computer’s “defining ability to execute a series of rules” (Murray 1998). Bogost distances procedurality from Murray’s other three properties (spatial, participatory, and encyclopedic) via an Aristotelian virtue argument. The latter three properties exist in other media, but procedurality is entirely unique to the digital medium. *Rhetoric* refers to the art of persuasion, a practice with a storied history in Western philosophy and creativity. Originally studied for oral communication only, the field of rhetoric was later expanded to include all media and manners of expression, not just those intended to change the opinions of others. The concept of procedural rhetoric stands as an argument against the colonizing efforts of structuralists and semioticians to apply the standards of written rhetoric to video games unthinkingly. Just as visual art requires a unique understanding of visual rhetoric, video games and other interactive software require their own form of rhetoric.

Bogost suggests that procedural rhetoric operates by means of an interaction model based on the Aristotelian enthymeme. An enthymeme omits one premise of an argument and expects the listener to fill it in. Bogost holds that a sophisticated, persuasive game will be able to constrain a player’s interactivity in much the same way, finding a game’s expressive meaning by following its rules to a designer’s premise. Procedural rhetoric can thus be seen as an author-centric design tool standing in opposition to Bogost’s reader-centric interpretive tool of the “unit operation,” wherein a player interrogates a “simulation gap” between a real-world system and its simulation model within a game to find and synthesize discrete units of meaning among objects, events, and actors (Bogost 2006).

Bogost explores procedural rhetoric in a number of examples from mainstream, educational, political, advertising, and exercise games. In one game from a popular crime simulation franchise, *Grand Theft Auto: San Andreas* (2004), Bogost reveals how the need to eat food to restore health is coupled with the omnipresence of fast food to create a procedural argument about the rise of obesity in underprivileged socioeconomic classes (Bogost 2007). Molleindustria's *McDonald's Game* (2006), in contrast, shows how the operation of a fast-food conglomerate necessitates unethical business practices. The game's procedures for calculating rising costs quickly overwhelm players, forcing them to practice deforestation, targeted advertising, and cattle hormone feeding to maintain profitability.

The study of procedural rhetoric is closely affiliated with broader arguments about the importance of developing a "procedural literacy" in educational institutions. As literacy is the ability to read, write, and critique a cultural symbol system, procedural literacy specifically deals with skills for reading, writing, and critiquing computer code. In *Newsgames: Journalism at Play*, Bogost, Ferrari, and Schweizer (2010) argue that the general cognitive strategies provided by procedural literacy can be applied, after specific training, to a variety fields, such as journalism, politics, and economics. Their position is that game design stands as the best way for practitioners of any field to gain a basic competency in procedural literacy.

Miguel Sicart (2011) has criticized procedurality in general and procedural rhetoric in particular as techniques that insufficiently address the player experience of games and that impose a creator's intention on the player.

Another advance in the practical application of procedural rhetoric comes from an analysis of the relationship between processes and graphical skins in *Kaboom!* (1981), an Activision game for the Atari VCS 2600, about preventing explosives dropped by a "Mad Bomber" from reaching the bottom of the screen by catching them in baskets. Treanor, Mateas, and Wardrip-Fruin (2010) isolate the agents and collision objects of the game and then show how the game's rhetoric changes after manipulating two types of values for each collision: whether a collision is good from the perspective of an object ("evaluative" manipulation) and whether an agent means to do what it does ("volitional" manipulation).

Once these values have been assigned, it becomes possible to reskin the assets of *Kaboom!* to create a virtually infinite number of games within different rhetorical archetypes. Treanor, Mateas, and Wardrip-Fruin (2010) prove that the semantic freight of a game's ruleset is both constrained and context specific. Bogost refers to this phenomenon as the "tight coupling" of visual and procedural rhetorics. Designers that simply reskin a popularly recognized game, such as *PONG* (1972), to raise a political issue without regard for the template game's procedural affordances tend to produce ineffective procedural arguments (Bogost 2007).

The designers of early simulation games can be seen as the forerunners of procedural rhetoric, inspiring many of Bogost's premises and design methodologies. The "mechanics are the message" school of design—personified by Brenda Brathwaite, Soren Johnson, and others—share Bogost's assertion that a game's meaning comes primarily from the interaction between its rules and its players (Johnson 2010). Similarly, developers of "immersive realism" games, such as Patrick Redding, argue that games should allow players to engage with meaning as a lived, systematic experience rather than feeding players meaning through traditional storytelling methods (Redding 2008).

Simon Ferrari and Ian Bogost

See also: Rhetoric; Unit Operations

Further Reading

Bogost, Ian. *Persuasive Games: The Expressive Power of Videogames*. Cambridge, MA: MIT Press, 2007.

Bogost, Ian. *Unit Operations*. Cambridge, MA: MIT Press, 2006.

Bogost, Ian, Simon Ferrari, and Bobby Schweizer. *Newsgames: Journalism at Play*. Cambridge, MA: MIT Press, 2010.

Johnson, Soren. “Theme Is Not Meaning (Part 1).” *Game Developer Magazine* (February 2010). Available at https://www.designer-notes.com/?p = 237.

Murray, Janet. *Hamlet on the Holodeck: The Future of Narrative in Cyberspace*. Cambridge, MA: MIT Press, 1998.

Redding, Patrick. “Do, Don’t Tell: The Narrative Design of FARCRY 2.” Presentation at the Game Developer’s Conference, San Francisco, CA, USA, February 18–22, 2008.

Sicart, Miguel. “Against Procedurality.” *Game Studies* 11, no. 3 (December 2011). Available at http://gamestudies.org/1103/articles/sicart_ap.

Treanor, Mike, Michael Mateas, and Noah Wardrip-Fruin. “Kaboom! Is a Many-Splendored Thing: An Interpretation and Design Methodology for Message-Driven Games Using Graphical Logic.” Paper presented at the Foundation of Digital Games Conference, Pacific Grove, CA, USA, June 19–21, 2010.

Psychodynamics

The psychodynamics of video game playing refers to the application of psychoanalytical theory and related concepts to the experience of playing a video game. This approach uses concepts of Sigmund Freud, Jacques Lacan, and others, following in their footsteps. These theories offer a framework for analyzing the psychosomatic processes occurring during gameplay. Video game playing can be divided into three dimensions, using Lacan’s distinctions between the “real,” the “symbolic,” and the “imaginary” (Lacan 1997, 7–15, 63). In the real rush of digital play, symbolic messages are exchanged between program and player that produce an imaginary illusion. The term *real* refers to the temporal and material dimensions of gameplay, the passage of time, and the stimulating progression of the digital simulation. The *symbolic* encompasses the structural logic of the binary code that defines everything in the game and that must be internalized by the player to play successfully. The *imaginary* is the dimension in which the player experiences the game and attributes meaning to it.

The temporal dimension of the real allows us to divide the process of video game playing into three fundamental phases: the learning phase, the fluid phase of gameplay in which the player dives into and focuses in on the experience of playing, and the resurfacing of the player from this intense involvement. Players have to first learn a game’s controls and rule system, which are prescribed on the level of the symbolic. The symbolic is the dimension that defines what exists in a given game and which actions are possible within it. A game's events unfold along symbolic chains, series of zeros and ones; everything must be anchored in the program code. Human players can interact with video games because they partake in the symbolic as well; players always have to interact with the code of a game, engaging its particular system of rules, to act in it. The interactivity of video game playing is grounded in the circulation of symbols between computer and player. Every legitimate interaction is defined in the symbolic order—what Lacan calls "the big Other," for which he accordingly uses the notation "A" (for French "Autre") in his algebra of the unconscious (Žižek 1999)—that is defined in the program code of a game. To play, the player must submit to a position that is prescribed by the program and differs from game to game. Success in the game occurs when the player's actions conform to the demands of the code.

From the perspective of cybernetic psychoanalysis, the player and the computer game form a unit, a "*cyborg,*" which is short for "cybernetic organism" (Haraway 1991). Both participate in the same information circuit and are connected through the interface of the game system, which can be divided into two layers: the invisible symbolic processes and the multisensory contact surface (Pias 2004). The symbolic processes take place within the computer as well as within the central nervous system of the player who has incorporated the rules of a game. They generally occur on an unconscious level—below the level of perception—and perform a twofold act of translation. The series of binary symbols connect the motor input of the player with the multisensory output of the program and create an information circuit in which both participate. The contact surface of the interface normally consists of a screen, loudspeakers, and controller. Players complement the visual, auditory, and haptic output of the game through their active imagination.

The imaginary is the dimension of the ego and the level on which computer game playing is consciously experienced by the player. On the level of the imaginary—a dimension that computers do not have, only human players—games become meaningful experiences. The series of zeros and ones generate whole worlds that are absolutely meaningless on the level of the symbolic but offer intensely engaging experiences in the imagination of the players. It is common for players to actively imagine themselves in a game world, taking on the identity of their avatar and having highly meaningful experiences. The playful act of pretending is what allows the player to enter into the game world on the other side of the screen. Together, player and program project the game's virtual reality —understood as the multisensory interaction with data structures—into the realm of the factual. During intense phases of play, the player's sense of reality is reoriented toward the game world, creating an affective link with the avatar.

Video game playing takes place along an axis of disembodiment and reembodiment. The technological interface disappears during the course of play, and the player dives into the game world—a phenomenon called *immersion*. When a player submits to the rules of a game, *transference* occurs—the psychoanalytical term for the mobilization and actualization of unconscious wishes (Laplanche and Pontalis 2006, 455–462). A player successfully coupled to a video game dives into an illusion that unfolds itself between his or her imagination and the multisensory contact surface of the interface. The visual, auditory, and vibratory patterns act together with the interactive possibilities of a virtual embodiment to make players forget their immediate surroundings as well as their physicality. Players connect with the role the game offers, and the virtual world becomes meaningful. One way of understanding the relationship between players and avatars is as a process of identification; players enter into a "mirror relationship" with their game figure. The avatar takes the position of what Lacan calls "object petit a"—the external picture that the unconscious self needs to introject to form an imaginary identity (Lacan 2006). And the player partakes in a real process of becoming that identity, whether the avatar is Lara Croft (*Tomb Raider* series), Niko Bellic (*Grand Theft Auto IV* [2008]), or the Zerg swarm (*StarCraft* [1998]) (Deuber-Mankowsky 2005; Butler 2010).

As soon as the controls of a game have been successfully mastered by the player, the experience of *flow* becomes possible, a term coined by the psychologist Mihalyi Csikzentmihalyi (2000) to refer to the phenomenon that an activity, which develops consistently out of itself, can take hold of the person performing the action and carry him or her away. People in this state of mind tend to forget themselves as their thinking and doing merge with each other. Self-reflexive thought patterns tend to disappear in the process of flow, the boundary between symbolic exchange and imaginary experience blurs, and a feeling of total control is experienced. The player's conscious ego (what Lacan calls "moi") does not think about which buttons to push; rather, the player's unconscious self (what Lacan calls "je" [Lacan 2006]) dances with the computer game.

The state of flow only lasts as long as the player is successful. Equally, the immersion of the player and the player's identification with the avatar is not total; they only exist while the game is running. During gameplay, the player's psyche oscillates between closeness to the avatar, bordering on symbiosis, and a self-reflective distance that occurs, for example, when a player tries to do something that is not anchored in the code, when his or her virtual embodiment dies, or when the gaming system malfunctions. In such moments, the interface stops being a connecting membrane between computer and player and makes its presence known as a border separating the two. Video game playing is, like every form of play, a schismatic experience that oscillates between the poles of intensive inebriation and reflexive awareness, between self-loss and self-reference (Butler 2010). The complementary experience to the imaginary immersion in a game is the moment when the symbolic underpinnings of the simulation are blatantly obvious. In the real process of gameplaying, the virtual world is alternately perceived as an "imaginary illusion" and as a "symbolic fiction," to use a distinction made by Slavoj Žižek (1997, 127–141). This doubling of the player into an involved actor and a distanced observer is constitutive for computer game playing, which always ends with an abruption of the gameplaying session, whereupon players not only emerge from their imaginary immersion but also become fully conscious of the time spent playing as well as bodily sensations such as hunger, thirst, and eventual aches.

Multiple partial drives are mobilized during video game playing. First, a stimulation of the visual, auditory, and tactile senses takes place. The conjunction of eye–screen, ear–speaker, and hand–controller are "erogenous zones" (Freud 2000), sources of pleasure, or, rather, "cyberogenous zones," erogenic zones that are part of a cybernetic loop. In the real rush of computer game playing, desire is invested in the perception process itself (Deleuze and Guattari 2004, 312–313), in the sights, sounds, and sensations of the game world. Second, computer game playing encompasses the desire to show. Players direct the action on the screen and gain pleasure from exhibiting their prowess to themselves and others. Third, the conjunction of hand and controller feeds into the drive for power and mastery. The practicing of the different control combinations to perfection as well as the successful mastering of the game's scenarios is a great source of pleasure for players. Fourth, the drive for knowledge and exploration is also fundamental for gameplay. Curiosity compels players forward because they want to know how a game will unfold. Finally, the desire for intense experiences is fundamental to gameplay, which always encompasses an anxious pleasure for the players. The uncertain outcome of the player's moves within the game feed into the heightened vitality of playing and is a fundamental component of all play. Regardless of which of these drives is most dominant in a given game, the libidinous configuration of gameplay strives for the establishment of plateaus, continuously flowing zones of vibrating intensity (Deleuze and Guattari 2004, 24).

Another way of understanding the relationship between player and avatar or, rather, the one between player and game, besides seeing it as identification, is to conceptualize it as a rhizomatic connection (Deleuze and Guattari 2004, 7); players deterritorialize themselves, dissolving their ego and its imaginary relationships, and reterritorialize themselves in the game worlds they partake in while playing. And the gaming systems they use simultaneously deterritorialize themselves through the multisensory performance of the interface and reterritorialize themselves in the imaginations and the bodies of the players. For example, reports from *SimCity* (1989) players describe how their perception of the nonvirtual cityscape changed after playing the game (Butler 2007, 148–149). Over the course of countless hours, in countless repetitions, players imprint the cognitive and sensomotoric structures demanded by the game on their bodies and imaginations. At the same time, players collect experience with the different facets of gameplay and gain increasing competency in dealing with the diverse psychodynamic phenomena described here.

Mark Butler

See also: Cognition; Emotion

Further Reading

Butler, Mark. "On Reality and Simulation in an Extra-Moral Sense: The Playful Logic of Life and Death in Liberty City." In *Logic and Structure of the Computer Game*, edited by Stephan Günzel, Michael Liebe, and Dieter Mersch, 212–236. Potsdam, Germany: Universitätsverlag Potsdam, 2010.

Butler, Mark. *Would You Like to Play a Game? Die Kultur des Computerspielens*. Berlin: Kadmos, 2007.

Csikszentmihalyi, Mihaly. *Beyond Boredom and Anxiety: Experiencing Flow in Work and Play*. San Francisco: Jossey-Bass, 2000.

Deleuze, Gille, and Félix Guattari. *A Thousand Plateaus: Capitalism and Schizophrenia*. Translated by Brian Massumi. New York: Continuum, 2004.

Deuber-Makowsky, Astrid. *Lara Croft: Cyber Heroine*. Translated by Dominic J. Bonfiglio. Minneapolis: University of Minnesota Press, 2005.

Freud, Sigmund. *Three Essays on the Theory of Sexuality*. Edited by James Strachey. New York: Perseus Books, 2000.

Haraway, Donna. "A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century." In *Simians, Cyborgs and Women: The Reinvention of Nature,* 149–181. New York: Routledge, 1991.

Lacan, Jacques. "The Mirror Stage as Formative of the Function of the I as Revealed in Psychoanalytic Experience." In Jacques Lacan, *Écrits: The First Complete Edition in English*, 75–81. Translated by Bruce Fink. New York: Norton, 2006.

Lacan, Jacques. *The Psychoses: The Seminar, Book III (1955–1956)*. Translated by R. Grigg. New York: Norton, 1997.

Laplanche, Jean, and Jean-Bertrand Pontalis. *The Language of Psychoanalysis*. London: Karnac, 2006, 455–462.

Pias, Claus. "Action, Adventure, Desire: Interaction with PC Games." In *Interactive Dramaturgies: New Approaches in Multimedia Content and Design*, edited by Heide Hagebölling, 133–148. Heidelberg, Germany: Springer, 2004.

Rehak, Bob. "Playing at Being: Psychoanalysis and the Avatar." In *The Video Game Theory Reader*, edited by Mark J. P. Wolf and Bernard Perron, 103–128. New York: Routledge, 2003.

Žižek, Slavoj. "The Matrix: Or, the Two Sides of Perversion." In *The Matrix and Philosophy: Welcome to the Desert of the Real*, edited by William Irwin, 240–266. Chicago: Open Court, 1999.

Žižek, Slavoj. *The Plague of Fantasies*. New York: Verso, 1997.

Psychological Research on Video Games

Psychologists have long been interested in the effects of media. Decades before video gaming became the popular form of entertainment it is today, researchers were examining the impact media models had on behavior. In 1961, Albert Bandura conducted his famous "Bobo Doll" experiment. This study revealed that preschoolers who watched an aggressive adult model were two times as likely as the control group to display aggressive play behavior. Bandura's social learning theory (Bandura 1973, 1977) paved the way in linking observation of violent media models on television, and later in video games, to aggressive behavior. A meta-analysis of 136 studies strongly indicated playing violent video games is a causal risk factor for aggressive thoughts, feelings, and behaviors (Anderson et al. 2010). A subsequent meta-analysis of 24 studies aimed to address criticisms of Anderson et al.'s findings (Prescott, Sargent, and Hull 2018); however, results supported the link between violent video games and physical aggression.

Impact of the media on behavior has been a hotly debated topic (Steinberg 2008). There are three theories that can be applied to understanding video game influence and usage. The uses and gratifications approach purports that individuals' preferences shape their video game usage (Katz, Blumler, and

Gurevitch 1974). Cultivation theory proposes that the content of video games shapes individuals' preferences and behaviors (Gerbner et al. 1994). Lastly, the media practice model suggests a reciprocal relationship between individuals' preferences and video game content (Steel and Brown 1995). Most early research focused on the negative impact of video games; however, today, many researchers are examining the benefits of video games.

Adults are concerned with the video game usage of young people. Parents and researchers believe that violent first-person shooting games have negative effects on children's mental health. Numerous studies (such as Anderson and Dill 2000; Bartlett, Harris, and Baldassaro 2007; and You, Kim, and No 2015) show that violent behavior and aggression increases after playing these games. Yet, DeCamp and Ferguson (2017) purport family and social variables moderate the relationship between violent video games and aggression. There is evidence that violent video games do not increase hostility in teenagers but do increase stress levels in girls (Ferguson et al. 2016). Some research supports competitive playing rather than violent content may increase aggression in the short term as well as longitudinally (Adachi and Willoughby 2013, 2016). Other research indicates playing video games for more than one hour a day may increase inattention symptoms, such as those associated with attention deficit hyperactivity disorder (ADHD; Chan and Rabinowitz 2006). In addition to increased hostility and inattention, video game usage has been correlated with obesity and low levels of physical activity (Koezuka et al. 2006). Moreover, it does not appear learning engagement or problem-solving skills gained from gaming transfer to classroom settings (Hoffman and Nadelson 2010).

As the world becomes increasingly technological, video game usage continues to grow. Many researchers are looking for ways to use video games as tools to enhance mental health. For example, a three-dimensional first-person shooter video game, *Medal of Honor: Pacific Assault* (2004), was used to enhance women's spatial abilities, such as mentally rotating objects, which are cognitive abilities necessary to succeed in science and engineering fields. Feng, Spence, and Pratt (2007) proposed video game training to increase the number of women in these male-dominated careers. For girls, coplaying games with parents may protect against the negative outcomes of aggression and decreased prosocial behaviors and increase family connectedness (Coyne et al. 2011). Research is growing in the area of investigating the utility of video games in autism treatments. Blum-Dimaya et al. (2010) used *Guitar Hero II* (2006) to teach children with autism appropriate leisure skills. Leisure skills are believed to enhance quality of life and allow increased development of social skills, two things important to individuals with disabilities such as autism or intellectual disability. Travers and colleagues (2017) used biofeedback-based video game balance training to improve posture in children with autism. Furthermore, playing video games fulfills socialization needs, such as peer recognition and competitive discussion (Hoffman and Nadelson 2010). Finally, playing active video games (e.g., on the Nintendo Wii) was significantly related to higher levels of physical activity (Leatherdale, Woodruff, and Manske 2010).

Rachel F. Pickett

See also: Health (Mental); Health (Physical)

Further Reading

Adachi, P. C., and Willoughby, T. "Demolishing the Competition: The Longitudinal Link between Competitive Video Games, Competitive Gambling, and Aggression." *Journal of Youth and Adolescence* 42, no. 7 (2013): 1090–1104. Available at https://doi.org/10.1007/s10964-013-9952-2.

Adachi, P. C., and Willoughby, T. "The Longitudinal Association between Competitive Video Game Play and Aggression among Adolescents and Young Adults." *Child Development* 87, no. 6 (2016): 1877–1892. Available at https://doi.org/10.1111/cdev.12556.

Anderson, C. A., and K. Dill. "Video Games and Aggressive Thoughts, Feelings, and Behavior in the Laboratory and in Life." *Journal of Personality and Social Psychology* 78, no. 4 (April 2000): 772–790. Available at https://www.apa.org/pubs/journals/releases/psp784772.pdf.

Anderson, C. A., A. Shibuya, N. Ihori, E. L. Swing, B. J. Bushman, A. Sakamoto, H. R. Rothstein, and M. Saleem. "Violent Video Game Effects of Aggression, Empathy, and Prosocial Behavior in Eastern and Western Countries: A Meta-Analytic Review." *Psychological Bulletin* 136 (2010): 151–173. Available at https://doi.org/10.1037/a0018251.

Bandura, Albert. *Aggression: A Social Learning Analysis*. Englewood Cliffs, NJ: Prentice-Hall, 1973.

Bandura, Albert. *Social Learning Theory*. Englewood Cliffs, NJ: Prentice-Hall, 1977.

Bartlett, C. P., R. J. Harris, and R. Baldassaro. "Longer You Play, the More Hostile You Feel: Examination of First Shooter Video Games and Aggression during Video Game Play." *Aggressive Behaviour* 33 (2007): 486–497.

Blum-Dimaya, A., S. A. Reeve, K. F. Reeve, and H. Hoch. "Teaching Children with Autism to Play a Video Game Using Activity Schedules and Game-Embedded Simultaneous Video Modeling." *Education and Treatment of Children* 33 (2010): 351–370.

Chan, P. A., and T. Rabinowitz. "A Cross-Sectional Analysis of Video Games and Attention Deficit Hyperactivity Disorder Symptoms in Adolescents." *Annals of General Psychiatry* 5 (2006): 16.

Coyne, S., L. Padilla-Walker, L. Stockdale, and R. Day. "Game On . . . Girls: Associations between Co-Playing Video Games and Adolescent Behavioral and Family Outcomes." *Journal of Adolescent Health* 49, no. 2 (2011): 160–165. Available at https://doi.org/10.1016/j.jadohealth.2010.11.249.

DeCamp, W., and C. Ferguson. "The Impact of Degree of Exposure to Violent Video Games, Family Background, and Other Factors on Youth Violence." *Journal of Youth and Adolescence* 46, no. 2 (2017): 388–400. Available at https://doi.org/10.1007/s10964-016-0561-8.

Feng, J., I Spence, and J. Pratt. "Playing an Action Video Game Reduces Gender Differences in Spatial Cognition." *Psychological Science* 18 (2007): 850–855.

Ferguson, C., B. Trigani, S. Pilato, S. Miller, K. Foley, and H. Barr. "Violent Video Games Don't Increase Hostility in Teens, but They Do Stress Girls Out." *Psychiatric Quarterly* 87, no. 1 (2016): 49–56. Available at https://doi.org/10.1007/s11126-015-9361-7.

Gerbner, G., L. Gross, M. Morgan, and N. Signorelli. "Growing Up with Television:

The Cultivation Perspective." In *Media Effects: Advances in Theory and Research*, edited by J. Bryant and D. Zillman, 17–41. Hillsdale, NJ: Erlbaum, 1994.

Hoffman, B., and L. Nadelson. "Motivational Engagement and Video Gaming: A Mixed Methods Study." *Education Tech Research Dev* 58 (2010): 245–270.

Katz, E., J. G. Blumler, and M. Gurevitch. "Utilization of Mass Communication by the Individual." In *The Uses of Mass Communications: Current Perspectives on Gratifications Research*, edited by J. G. Blumler and E. Katz, 19–32. Beverly Hills, CA: Sage, 1974.

Koezuka, N., M. Koo, K. R. Allison, E. M. Adlaf, J. J. Dwyer, G. Faulkner, and J. Goodman. "The Relationship between Sedentary Activities and Physical Inactivity among Adolescents: Results from the Canadian Community Health Survey." *Journal of Adolescent Health* 4 (2006): 515–522.

Leatherdale, S. T., S. J. Woodruff, and S. R. Manske. "Energy Expenditure while Playing Active and Inactive Video Games." *American Journal of Health Behavior* 34 (2010): 31–35.

Prescott, A., J. Sargent, and J. Hull. "Metaanalysis of the Relationship between Violent Video Game Play and Physical Aggression over Time." *Proceedings of the National Academy of Sciences of the United States of America* 115, no. 40 (2018): 9882–9888. Available at https://doi.org/10.1073/pnas.1611617114.

Steel, J., and J. Brown. "Adolescent Room Culture: Studying Media in the Context of Everyday Life." *Journal of Youth and Adolescence* 24 (1995): 551–576.

Steinberg, L. *Adolescence*. 8th ed. New York: McGraw Hill, 2008.

Travers, B., A. Mason, L. Mrotek, A. Ellertson, D. Dean, C. Engel, . . . K. McLaughlin. "Biofeedback-Based, Videogame Balance Training in Autism." *Journal of Autism and Developmental Disorders* 48, no. 1 (2018): 163–175. Available at https://doi.org/10.1007/s10803-017-3310-2.

You, S., E. Kim, and U. No. "Impact of Violent Video Games on the Social Behaviors of Adolescents: The Mediating Role of Emotional Competence." *School Psychology International* 36, no. 1 (2015): 94–111. Available at https://doi.org/10.1177/0143034314562921.

Encyclopedia of Video Games

Encyclopedia of Video Games

THE CULTURE, TECHNOLOGY, AND ART OF GAMING

SECOND EDITION

VOLUME III: Q–Z

Mark J. P. Wolf, Editor

GREENWOOD™

An Imprint of ABC-CLIO, LLC
Santa Barbara, California • Denver, Colorado

Copyright © 2021 by ABC-CLIO, LLC

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, except for the inclusion of brief quotations in a review, without prior permission in writing from the publisher.

Library of Congress Cataloging-in-Publication Data

Names: Wolf, Mark J. P., editor.
Title: Encyclopedia of video games : the culture, technology, and art of gaming / Mark J.P. Wolf, editor.
Description: Second edition. | Santa Barbara, California : ABC-CLIO, LLC, [2021] | Includes bibliographical references and index.
Identifiers: LCCN 2021007328 (print) | LCCN 2021007329 (ebook) | ISBN 9781440870194 (set) | ISBN 9781440878640 (v. 1 ; hardcover) | ISBN 9781440878657 (v. 2 ; hardcover) | ISBN 9781440878664 (v. 3 ; hardcover) | ISBN 9781440870200 (ebook)
Subjects: LCSH: Video games—Encyclopedias.
Classification: LCC GV1469.3 .E65 2021 (print) | LCC GV1469.3 (ebook) | DDC 794.803—dc23
LC record available at https://lccn.loc.gov/2021007328
LC ebook record available at https://lccn.loc.gov/2021007329

ISBN: 978-1-4408-7019-4 (set)
978-1-4408-7864-0 (vol. 1)
978-1-4408-7865-7 (vol. 2)
978-1-4408-7866-4 (vol. 3)
978-1-4408-7020-0 (ebook)

25 24 23 22 21 1 2 3 4 5

This book is also available as an eBook.

Greenwood
An Imprint of ABC-CLIO, LLC

ABC-CLIO, LLC
147 Castilian Drive
Santa Barbara, California 93117
www.abc-clio.com

This book is printed on acid-free paper ∞

Manufactured in the United States of America

Contents

List of Entries

Guide to Related Topics

Foreword to the Second Edition

Foreword to the First Edition

Preface

Acknowledgments

A–Z Entries

About the Editor and Contributors

Index

List of Entries

Abbas, Reine
Abstraction
Abzû
Accessibility
Activision
Activision Blizzard
Adaptation
Addiction
Adventure
Adventure Games
Advergames
Advertising
Affordances
Africa
Afroes
Angry Birds
Animal Crossing Series
Animation (Computer)
Animation (Hand-Drawn)
Apocalypse
Apple Bandai Pippin
Apps (Applications)
Arakawa, Minoru
Arcade Cabinet Art
Arcade Games
Arcades
Archives
Argentina
Art
Art, Video Games as
Artificial Intelligence
Asheron's Call

Association for UK Interactive Entertainment
Atari
Atari, Inc. v. North American Philips Consumer Electronics Corp.
Atari 5200
Atari Jaguar
Atari Lynx
Atari 7800 ProSystem
Atari VCS 2600
Audio (Dynamic, Interactive, and Adaptive)
Augmented Reality
Australia
Avatars
AY-3-8500 Chip
Baer, Ralph H.
Bailey, Dona
Ball-and-Paddle Games
Bally
Battlezone
"Beating" a Game
Bemani
Biomechanics
BioShock Series
Board Games
Boss Keys
Brazil
Brown v. Entertainment Merchants Association
Bulletin Board Systems
Bungie
Bushnell, Nolan
Caillois, Roger
Call of Duty Series
Canada
Candy Crush Saga
Capcom
Capcom USA v. Data East
Careers
Cartridges
Casual Games
CD-ROM-Based Games
Censorship
Cheating
Checkpoints
Chen, Jenova
Chile
China
Cinematronics
City of Mesquite v. Aladdin's Castle, Inc.
Civic Engagement

Co-Creativity
Codemasters
Cognition
Coleco
ColecoVision
Collecting Video Games
Colombia
Comics
Computer Games
Computer Games Magazine
Computer Gaming World
Computer Space
Console-Based Games
Contemplative Games
Controllers
Conventions
Cooperative Gameplay
Cow Clicker
Crash of 1977
Crash of 1983
Crawford, Chris
Cuphead
Cutscenes
CVC GameLine Master Module
Cyan Worlds
Czech Republic
Dance Dance Revolution
Data East USA v. Epyx
Dating Sims
Death and Resurrection
DECO Cassette System
Defender
Deludic Play
Demoscenes
Denmark
Digital Games Research Association
Digital Games Research Center
Dimensionality
DOOM
Dual In-Line Parallel Switches
Duncan, Theresa
DVD and Blu-Ray Disc Games
Dystopian Games
Easter Eggs
Education (General)
Education (Job Training)
Education (Religious)
Egypt

Elder Scrolls, The Series
Electromechanical Games
Electronic Arts
Emotion
Emulators
Entertainment Software Association
Entertainment Software Rating Board
Environmentalism
Erikawa, Keiko
Esports
Europe (Central and Eastern)
Europe (Western)
EVE Online
EverQuest
Experimental Games
Failure
Fairchild/Zircon Channel F
Fallout Series
Fandom
FarmVille
Femininity
FIFA Series
Fighting Games
Film
Finland
“First” Video Game
First-Person Shooters
Football Games
Fortnite
France
Free-to-Play Model
Fullerton, Tracy
Galaxy Game
Gambling
Game, Definition of
Game Design
Game Developers Conference
Game Engines
Game Feel
Game Genealogies
Game Guides
Game Informer
Game Manuals
Game Modifications
Game Studies
Game Transfer Phenomena
Game Writing
Gamergate

Gamers Outreach Foundation
Games, Philosophical Critique of
Games and Culture
Games Done Quick
Gamification
Garriott, Richard
GCE/Milton Bradley Vectrex
Gender
Generations of Technology
Germany
Gestural Interfaces
Girls’ Games
Githuku-Shongwe, Anne
Glitches
Global Reach of Games
God Games
Gold Farming
Google Play (Portal)
Grand Theft Auto Series
Graphics
Hacking
Handheld Games
Hawkins, Trip
HDTV Games
Health (Mental)
Health (Physical)
Heineman, Rebecca
Help Function
Hip-Hop
History of Video Games
HoloLens
Homebrew Games
Hong Kong
Houser, Sam and Dan
HTC Vive
Huizinga, Johan
Hungary
I, Robot
Iceland
id Software
Idea for Home Video Games
Immersion
Immersion v. Sony
Incremental Games
India
Indonesia
Industry
Infocom

Interactive Movies
Interface
International Center for the History of Electronic Games
International Game Developers Association
Ireland
Italy
JAMMA Standard
Japan
Jensen, Jane
Jordan
Journalism
Joysticks
Killer List of Videogames
King of Fighters, The Series
Kirby Series
Kirschenbaum v. Electronic Arts
Kojima, Hideo
Konami
Language
Laserdisc Games
Latin America
Latinos and Video Games
Laurel, Brenda
Lebanon
Legend of Zelda, The Series
LEGO Video Games
Let’s Play Videos
Localization
Ludology
Machinima
Magic Circle
Magnavox Odyssey
Mainframe Games
MAME
Maps
Mario Kart Series
Mario Series
Masculinity
Massively Multiplayer Online Role-Playing Games
Mattel Intellivision
Maxis Software
McGonigal, Jane
Meier, Sid
Merchandising
Meridian 59
Metagames
Metal Gear Series
Metalepsis

Metaphor
Metatextuality
Metroid Series
Mexico
MicroProse
Microsoft Xbox
Microsoft Xbox One
Microsoft Xbox 360
Middle East
Midway Games
Midwest Gaming Classic
Military Use of Games
Minecraft
Minigames
Mixed Reality
Mobile Games
Molyneux, Peter
Morality and Ethics
Mortal Kombat
Motion Capture and Motion Control
Multiuser Domains
Museum of the Game
Music
Myst
Namco
Narrative
Navigation (Spatial)
Navigation (Temporal)
NCSoft
NEC PC-Engine/TurboGrafx-16
Neo•Geo
NetEase
Netherlands, The
New Zealand
Newsgames
Night Journey, The
Nintendo
Nintendo DS
Nintendo Entertainment System/Nintendo Famicom
Nintendo Game Boy
Nintendo GameCube
Nintendo 64
Nintendo Switch
Nintendo Virtual Boy
Nintendo v. Blockbuster Video
Nintendo Wii
Nintendo Wii U
Non-Player Characters

Norway
Oculus Rift
Online Games
Ontology
Open-Source Software
Oregon Trail, The
Outsourcing
OUYA
Overwatch
Packaging
Pac-Man
Pan European Game Information System
Paradox Interactive
Patent #2,455,992
PC Bangs
Performance
Peripherals
Persistent Games
Pervasive Games
Phenomenology
Philips CD-i
Piracy in China
Platforms
Play
Play Meter Magazine
Playrix
Pokémon GO
Poland
PONG
Portal Series
Portugal
Preservation
Procedural Generation
Procedural Rhetoric
Psychodynamics
Psychological Research on Video Games
*Q*bert*
Qix
Quick Time Events
Quraish
Race
Racing Games
Reading Video Game Imagery
Reception Theory
Reddy, Siobhan
Remediation
Replay and Repetition
RePlay Magazine

Representations of Video Games in Hollywood Cinema
Resident Evil Series
Resolution
Resource Management Games
Retrogaming
Rhetoric
Rhythm and Dance Games
Ritual
Riven
Rockstar Games
Rohrer, Jason
Role-Playing Games
Romania
Romero, Brenda
Ross, Bonnie
Rules
Russia
Santiago, Kellee
Saudi Arabia
Save Function
Scepter of Goth
Scrolling
SEGA
SEGA CD/Mega-CD
SEGA Dreamcast
SEGA Game Gear
SEGA Genesis/SEGA Mega Drive
SEGA Master System/SEGA Mark III
SEGA Saturn
Serious Games
Shareware Games
Shaw, Carol
Shooting Games
Sierra Entertainment
Silent Film
Silicon Knights v. Epic Games
Sim Series
Sims, The Series
Simulation Games
Singapore
SNK (Shin Nihon Kikaku) Playmore
Social Media
Sony Corporation
Sony PlayStation
Sony PlayStation 2
Sony PlayStation 3
Sony PlayStation 4
Sony v. Bleem

Sound
Sound Technology
South Africa
South Korea
Space (Narrative)
Space (Visual)
Space Invaders
Spacewar!
Spain
Spector, Warren
Speedruns
Spirituality
Sports Games
Square Enix
StarCraft
Stealth Games
Steam (Portal)
Strategy Games
Streaming
Street Fighter II
Strong National Museum of Play
Subcreation
Suicide Battery
Super Nintendo Entertainment System/Super Famicom
Supergiant Games
Survival Horror Games
Sustainability
Sweden
Switzerland
Syria
Television
Tempest
Tencent Holdings Ltd.
Tetris
Text Adventure Games
Thailand
thatgamecompany
3-D Hardware
3DO Interactive Multiplayer
Time
Tool-Assisted Superplay
Touchscreen Games
Treasure Co. Ltd.
Turkey
Twin Galaxies
Twitch
Ubiquitous Games
Ubisoft

Ultima Series
Unit Operations
United Arab Emirates
United Kingdom
United States of America
Universal City Studios, Inc. v. Nintendo Co. Ltd.
Unlockable Games
Unreal Engine
Uruguay
Vector Games
Vectorbeam
Video Game Literacy
Video Game Movies
Video Game Museums
Video Game Novels
Video Game Studies
Video Games and Literature
Video Games as Collectibles
Video Games within Video Games
Videotopia
Vintage Arcade Preservation Society
Violence
Virtual Pets
Virtual Reality
Visual Literacy
Visual Novels
Walden, a Game
Walkthroughs
War
Warnets
Web-Based Games
Weisbecker, Joyce
West and Zampella v. Activision
Wii Sports
Williams (Company)
Williams, Roberta
World (of a Video Game)
World Cyber Games
World of Warcraft
World Video Game Hall of Fame
World War II in Video Games
Wright, Will
XaviXPORT
Xbox Game Studios
Xiaobawang System
XNA
Yokoi, Gunpei
YouTube

Zapak (Portal)
Z-Axis Depth
Zaxxon
Zeebo
Zen Mode
Zynga Inc.

Guide to Related Topics

Associations and Institutions

Association for UK Interactive Entertainment (UKIE)
Digital Games Research Association (DiGRA)
Digital Games Research Center (DIGAREC)
Entertainment Software Association (ESA)
Entertainment Software Rating Board (ESRB)
Game Developers Conference (GDC)
Gamers Outreach Foundation
Games Done Quick (GDQ)
International Center for the History of Electronic Games (ICHEG)
International Game Developers Association (IGDA)
Killer List of Videogames (KLOV)
Midwest Gaming Classic (MGC)
Museum of the Game (MOG)
Pan European Game Information (PEGI) System
Strong National Museum of Play
Twin Galaxies
Video Game Museums
Videotopia
Vintage Arcade Preservation Society (VAPS)
World Cyber Games
World Video Game Hall of Fame

Business and Industry

Arcades
Archives
Atari, Inc. v. North American Philips Consumer Electronics Corp.

Brown v. Entertainment Merchants Association
Capcom USA v. Data East
Careers
City of Mesquite v. Aladdin's Castle, Inc.
Crash of 1977
Crash of 1983
Data East USA v. Epyx
Esports
Free-to-Play Model
Gambling
Gamergate
Gamification
Gold Farming
Immersion v. Sony
Industry
Kirschenbaum v. Electronic Arts
Localization
Merchandising
Nintendo v. Blockbuster Video
Outsourcing
Packaging
Patent #2,455,992
PC Bangs
Piracy in China
Preservation
Silicon Knights v. Epic Games
Sony v. Bleem
Sustainability
Universal City Studios, Inc. v. Nintendo Co. Ltd.
Warnets
West and Zampella v. Activision

Companies

Activision
Activision Blizzard
Afroes
Atari
Bally
Bemani
Bungie
Capcom
Cinematronics
Codemasters
Coleco
Cyan Worlds

Electronic Arts (EA)
Google Play (Portal)
id Software
Infocom
Konami
Maxis Software
MicroProse
Midway Games
Namco
NCSoft
NetEase
Nintendo
Paradox Interactive
Playrix
Rockstar Games
SEGA
Sierra Entertainment
SNK (Shin Nihon Kikaku) Playmore
Sony Corporation
Square Enix
Steam (Portal)
Supergiant Games
Tencent Holdings Ltd.
thatgamecompany
3DO Interactive Multiplayer
Treasure Co. Ltd.
Twitch
Ubisoft
Vectorbeam
Williams (Company)
YouTube
Zapak (Portal)
Zynga Inc.

Games

Abzû
Adventure
Angry Birds
Animal Crossing Series
Asheron's Call
Battlezone
BioShock Series
Call of Duty Series
Candy Crush Saga
Computer Space

Cow Clicker
Cuphead
Dance Dance Revolution (DDR)
Defender
DOOM
Elder Scrolls, The Series
EVE Online
EverQuest
Fallout Series
FarmVille
FIFA Series
Fortnite
Galaxy Game
Grand Theft Auto Series
I, Robot
King of Fighters, The Series
Kirby Series
Legend of Zelda, The Series
LEGO Video Games
Mario Kart Series
Mario Series
Meridian 59
Metal Gear Series
Metroid Series
Minecraft
Mortal Kombat
Myst
Night Journey, The
Oregon Trail, The
Overwatch
Pac-Man
Pokémon GO
PONG
Portal Series
*Q*bert*
Qix
Quraish
Resident Evil Series
Riven
Scepter of Goth
Sim Series
Sims, The Series
Space Invaders
Spacewar!
StarCraft
Street Fighter II
Tempest
Tetris

Ultima Series
Walden, a game
Wii Sports
World of Warcraft (WoW)
Zaxxon

Other Media

Animation (Computer)
Animation (Hand-Drawn)
Apps (Applications)
Arcade Cabinet Art
Art
Art, Video Games as
Augmented Reality (AR)
Board Games
Comics
Computer Games Magazine
Computer Gaming World
Electromechanical Games
Esports
Film
Game Informer
Game Studies
Games and Culture
Hip-Hop
Journalism
Let's Play Videos
Machinima
Mixed Reality (MR)
Music
Open-Source Software
Play Meter Magazine
Replay Magazine
Silent Film
Social Media
Streaming
Television
Video Game Literacy
Video Game Movies
Video Game Novels
Video Games within Video Games
Virtual Reality (VR)
YouTube

People

Abbas, Reine
Arakawa, Minoru
Baer, Ralph H.
Bailey, Dona
Bushnell, Nolan
Caillois, Roger
Chen, Jenova
Crawford, Chris
Duncan, Theresa
Erikawa, Keiko
Fullerton, Tracy
Garriott, Richard
Githuku-Shongwe, Anne
Hawkins, Trip
Heineman, Rebecca
Houser, Sam and Dan
Huizinga, Johan
Jensen, Jane
Kojima, Hideo
Laurel, Brenda
McGonigal, Jane
Meier, Sid
Molyneux, Peter
Reddy, Siobhan
Rohrer, Jason
Romero, Brenda
Ross, Bonnie
Santiago, Kellee
Shaw, Carol
Spector, Warren
Weisbecker, Joyce
Williams, Roberta
Wright, Will
Yokoi, Gunpei

Regions

Africa
Argentina
Australia
Brazil
Canada
China
Colombia

Czech Republic
Denmark
Egypt
Europe (Central and Eastern)
Europe (Western)
Finland
France
Germany
Hong Kong
Hungary
Iceland
India
Indonesia
Ireland
Italy
Japan
Jordan
Latin America
Lebanon
Mexico
Middle East
New Zealand
Netherlands, The
Norway
Poland
Portugal
Romania
Russia
Saudi Arabia
Singapore
South Africa
South Korea
Spain
Sweden
Switzerland
Syria
Thailand
Turkey
United Arab Emirates (UAE)
United Kingdom
United States of America
Uruguay

Systems

Apple Bandai Pippin

Atari 5200
Atari Jaguar
Atari Lynx
Atari 7800 ProSystem
Atari VCS 2600
ColecoVision
Fairchild/Zircon Channel F
GCE/Milton Bradley Vectrex
HoloLens
HTC Vive
Magnavox Odyssey
Mattel Intellivision
Microsoft Xbox
Microsoft Xbox One
Microsoft Xbox 360
NEC PC-Engine/Turbografx-16
Neo•Geo
Nintendo DS
Nintendo Entertainment System (NES)/Nintendo Famicom
Nintendo Game Boy
Nintendo GameCube
Nintendo 64
Nintendo Switch
Nintendo Virtual Boy
Nintendo Wii
Nintendo Wii U
Oculus Rift
OUYA
Philips CD-i
SEGA CD/Mega-CD
SEGA Dreamcast
SEGA Game Gear
SEGA Genesis/SEGA Mega Drive
SEGA Master System/SEGA Mark III
SEGA Saturn
Sony PlayStation
Sony PlayStation 2
Sony PlayStation 3
Sony PlayStation 4
Super Nintendo Entertainment System (SNES)/Super Famicom
XaviXPORT
Xiaobawang System
Zeebo

Technology

Artificial Intelligence (AI)
Audio (Dynamic, Interactive, and Adaptive)
Augmented Reality (AR)
AY-3-8500 Chip
Biomechanics
Boss Keys
Bulletin Board Systems (BBSs)
Cartridges
CD-ROM-Based Games
Checkpoints
CVC GameLine Master Module
DECO Cassette System
Dual In-Line Parallel (DIP) Switches
Easter Eggs
Electromechanical Games
Emulators
Game Design
Game Engines
Game Modifications
Generations of Technology
Gestural Interfaces
Glitches
Gold Farming
Graphics
Hacking
Help Function
Interface
JAMMA Standard
Joysticks
MAME
Mixed Reality (MR)
Motion Capture and Motion Control
Multiuser Domains (MUDs)
Open-Source Software
Peripherals
Platforms
Preservation
Procedural Generation
Quick Time Events (QTEs)
Resolution
Save Function
Scrolling
Sound Technology
Speedruns
Streaming
Suicide Battery
Sustainability
3-D Hardware

Tool-Assisted Superplay (TAS)
Touchscreen Games
Unreal Engine
Vector Games
Video Game Museums
Virtual Reality (VR)
XNA
Zen Mode

Theoretical Concerns

Abstraction
Accessibility
Adaptation
Addiction
Advertising
Affordances
Apocalypse
Arcades
Art
Art, Video Games as
Audio (Dynamic, Interactive, and Adaptive)
Augmented Reality (AR)
Avatars
“Beating” a Game
Biomechanics
Censorship
Cheating
Civic Engagement
Co-Creativity
Cognition
Collecting Video Games
Controllers
Conventions
Cooperative Gameplay
Cutscenes
Death and Resurrection
Deludic Play
Demoscenes
Dimensionality
Education (General)
Education (Job Training)
Education (Religious)
Emotion
Environmentalism
Failure

Fandom
Femininity
“First” Video Game
Game, Definition of
Game Design
Game Feel
Game Genealogies
Game Guides
Game Manuals
Game Modifications
Game Transfer Phenomena
Game Writing
Games, Philosophical Critique of
Gamification
Gender
Gestural Interfaces
Global Reach of Games
Graphics
Health (Mental)
Health (Physical)
Help Function
History of Video Games
Idea for Home Video Games
Immersion
Interface
Language
Latinos and Video Games
Ludology
Machinima
Magic Circle
Maps
Masculinity
Metagames
Metalepsis
Metaphor
Metatextuality
Military Use of Games
Mixed Reality (MR)
Morality and Ethics
Narrative
Navigation (Spatial)
Navigation (Temporal)
Non-Player Characters (NPCs)
Ontology
Performance
Phenomenology
Play
Procedural Rhetoric

Psychodynamics
Psychological Research on Video Games
Race
Reading Video Game Imagery
Reception Theory
Remediation
Replay and Repetition
Representations of Video Games in Hollywood Cinema
Retrogaming
Rhetoric
Ritual
Rules
Save Function
Sound
Space (Narrative)
Space (Visual)
Speedruns
Spirituality
Subcreation
Sustainability
Time
Unit Operations
Video Game Studies
Video Games as Collectibles
Violence
Virtual Reality (VR)
Visual Literacy
Walkthroughs
War
World (of a Video Game)
World War II in Video Games
Z-Axis Depth
Zen Mode

Types of Games

Adventure Games
Advergames
Arcade Games
Ball-and-Paddle Games
Board Games
Casual Games
CD-ROM-Based Games
Computer Games
Console-Based Games
Contemplative Games

Dating Sims
DVD and Blu-Ray Disc Games
Dystopian Games
Electromechanical Games
Esports
Experimental Games
Fighting Games
First-Person Shooters (FPSs)
Football Games
Girls' Games
God Games
Handheld Games
HDTV Games
Homebrew Games
Incremental Games
Interactive Movies
Laserdisc Games
Mainframe Games
Massively Multiplayer Online Role-Playing Games (MMORPGs)
Minigames
Mobile Games
Newsgames
Online Games
Persistent Games
Pervasive Games
Racing Games
Resource Management Games
Rhythm and Dance Games
Role-Playing Games (RPGs)
Serious Games
Shareware Games
Shooting Games
Simulation Games
Sports Games
Stealth Games
Strategy Games
Survival Horror Games
Text Adventure Games
Touchscreen Games
Ubiquitous Games
Unlockable Games
Vector Games
Virtual Pets
Visual Novels
Web-Based Games

Q

*Q*bert*

*Q*bert* hopped into arcades in 1982; it was Gottlieb's fourth game and its only coin-op hit. In the game, Q*bert, a round character with a tubular nose, giving his head a "Q" shape, must traverse a pyramidal playfield one cube at a time, changing the color of the tops of the cubes with every touch, until they are all one uniform color. Released at a time when many arcade games were violent by design, *Q*bert* had an innocent charm. Because the protagonist was unarmed and the playfield was filled with various enemies, Q*bert had to survive by his wits and dexterity.

In the beginning of the game design process, Q*bert shot projectiles from his nose, thus the presence of his extended snout. The working name for the game at one time was *Snots & Boogers*, but it was changed, according to *Q*bert* artist Jeff Lee, because the title was "considered too vulgar for a business in an industry which had always struggled against the taint of disrepute" (Lee and Thomasson 2003).

Cube motifs from the art of M. C. Escher heavily influenced *Q*bert*'s art and design. Escher's *Relativity* (1953) set the stage for the unusual orientation of the characters Wrongway and Ugg as they travel on the pyramid. Similar to the groundbreaking arcade game *Zaxxon* (1982), *Q*bert*'s unique art style features an isometric view that offers a visual representation of a three-dimensional playfield in two dimensions.

The final name chosen for the game evolved during a brainstorming session from the random name "Hubert" and the word "cube," taken from the design style of the shapes that make up the pyramidal playfield: Cube + Hubert = Cubert. The word *cube* was shortened to the letter *Q* for pronunciation, finally arriving at the name for the game, *Q*bert*.

The arcade game's marquee exclaims "@!#?@!," implying that Q*bert is disgruntled. Amazingly, the console speaks its own unique language; the seemingly unlimited vocabulary of Q*bert is actually the machine's synthesizer generating random sounds. Audio engineer David Thiel developed the technique that strung together random phonemes. As a consequence, the machine spits out a different string of gibberish each time the game is played and, on occasion, accidentally creates an actual coherent word.

In the end, approximately twenty-five thousand *Q*bert* coin-op machines were sold (Kent 2001). The game became a household name, and as a result, multiple licensing deals were negotiated. Q*bert could be seen gracing products such as board games, frisbees, lunch boxes, and more. Q*bert even had an animated Saturday morning cartoon, broadcast as part of CBS's *Saturday Supercade*. *Q*bert* was one of the few arcade games to also get a pinball treatment as Q*bert's Quest (1983).

The game spawned an additional arcade title, *Q*bert's Qubes* (1983). Numerous home console and home computer variations as well as sequels, such as *Q*Bert Rebooted* (2014), were released for dozens of home video game platforms. *Q*bert*'s legacy continues to grow, with the character appearing in the theatrical movie *Pixels* (2015) and Disney's *Wreck-It Ralph* film series.

Michael Thomasson

See also: Arcade Games

Further Reading

Kent, Steven L. *The Ultimate History of Video Games*. New York: Random House International/Three Rivers Press, 2001.

Lee, Jeff, and Michael Thomasson. "Interview." 2003. Available at http://www.gooddealgames.com/interviews/int_Jeff_Lee.html.

Qix

Taito's arcade game *Qix* (1981) is a very abstract game, even for its time. The coin-ops' attract mode reads, "Your marker controlled with joystick. To draw stix press fast or slow. Claim areas by joining walls with stix." In its most basic form, *Qix* is a real estate acquisition game, but even that description is vague and confusing. The attract mode continues, "Scores based on area. Fast score 250. Slow score 500. Claim more than 75% of playfield for special bonus." While the player attempts to claim playfield space, the Qix tries to prevent such action and is deadly to the touch.

As intangible as the gameplay may seem sight unseen, its name is also just as confusing; it is pronounced "kicks." There are two stories rumored to explain the possible origin of how the game received its unique name; as with much lore, these should be taken with a grain of salt. The first tale goes something like this: Taito debuted the game at the 1981 AMOA show, the press was on hand for the event, and the game was made available for play to attendees and honored guests. This was the early 1980s, and Atari was on top; therefore, much of the camera eye focused on Atari founder Nolan Bushnell. Rumor has it that he sampled Taito's new game, giving the cabinet "kicks" in frustration as he quickly lost his tokens to the machine. While it is not wholly unusual for a product to be displayed before a product name has been assigned, and while this event is recorded to have happened, it is probably more plausible that codesigner and programmer Randy Pfeiffer, who had his automobile decorated with a vanity license plate stating "JUS4QIX," continued his trend by aptly naming his game the same. This story has been shared by his wife, Sandy (Thomasson 2009).

While maze games and intergalactic battles ruled the early arcades, *Qix* was a breath of fresh air and a shot of originality when it appeared on the scene in

1981. As the first “drawing game,” there was nothing like it in the arcades, and it was very much ahead of its time. Unlike Taito’s *Space Invaders* (1978), and most Taito games, *Qix* was created in the United States and not imported from the Japanese market; perhaps that is why the game design was so radically different from other games of the time.

Initially, *Qix* jumped to the top of the charts. However, its popularity dropped off as players deemed the machine “simply unbeatable” due to the random and unpredictable movement of the dreaded Qix. With an enormous number of possible movement combinations and no patterns to fool the Qix opponent, even the best players lost interest when they could not improve their scores and best the *Qix* cabinet.

Qix vanished from the arcades rather quickly after its short but modest success. Most machines were converted to higher-earning Taito titles. The arcade version of *Qix* is a rare find and is becoming more valuable to coin-op collectors and fans alike.

Qix II Tournament (1982*)* offered an enhanced variant that altered the color scheme. Taito placed *Qix* in a state of dormancy for a half decade until Taito released *Super Qix* (1987) in the arcade to little fanfare. In Japan, another sequel, known as *Volfied* (1989), was released, which was published in North America as *Ultimate Qix* (1991) on the SEGA Genesis and later on the *Taito Legends* (2005) compilation for the PlayStation 2 and Xbox.

Taito also licensed *Qix* for release on the Gameboy (1990), the Nintendo Entertainment System (NES; 1991), the Atari Lynx (1991), the Game Boy Color (1999), and the original PlayStation (2004). *Qix*+ + (2010) was made available on UMD disc in Japan for the PlayStation Portable (PSP) and was available for digital download on Xbox Live, as well.

Michael Thomasson

See also: Arcade Games

Further Reading

Houghton, Carl. “Why I Love: Qix (Game Boy).” Funstock Retro, July 18, 2018. Available at https://www.funstockretro.co.uk/news/why-i-love-qix-game-boy/.

Thomasson, Michael C. “Get Your KICKS from QIX!” Good Deal Games, 2009. Available at http://www.gooddealgames.com/articles/Qix%20Coin-Op.html.

Quick Time Events (QTEs)

Quick time events (QTEs) refer to the integration of fast-paced and largely predetermined hand-eye coordination challenges within the confines of a broader ludic system. The gameplay configuration associated with QTEs is strongly evocative of laserdisc-based games emerging in the arcades at the turn of the 1980s, epitomized by the release of *Dragon’s Lair* (1983). In terms of challenge, it can also be related to electromechanical novelty games found in arcades and at fairs and more recently to rhythm-and-dance video games. In contrast with Whac-A-Mole variations and *Dance Dance Revolution* (1998), the fast execution challenge associated with QTE segments represents a side attraction within a more complicated game configuration. It is commonly defined as a type of minimally interactive cutscene (Klevjer 2014).

Before the proliferation of the expression “quick time events” at the turn of the 2000s, *Dragon’s Lair* often acted as a metonymic generic marker encompassing all games that relied on matching inputs with on-screen signals integrated over lavish animated backgrounds. In terms of structure, these data-intensive assets can be acted out in a strictly linear “fail or pass” type of sequence or in a multidirectional network or directed flowchart. This hypermedia-like architecture was typical of early laserdisc-based games; *Dragon’s Lair*, for instance, switched the order of narratively autonomous scenes before leading players to the final confrontation. QTE segments integrated in *Die Hard Arcade* (1996) and *Shenmue* (1999) tend to follow a less complicated, unidirectional logic in which fail states represent the main variation. The background assets are commonly generated through the remediation of static media such as animation or live-action sequences; even instances built upon real-time 3-D engines, such as those seen in *God of War III* (2010), rely on static motion capture or animations. QTEs represent a way for designers to secure more control over the spectacular execution of action sequences.

QTE-type challenges tend to be associated with a simplification of gameplay that seeks to emphasize pure spectacle. Games that integrate these segments to a large extent have been criticized for their overtly directive nature, especially in the context of action games. Kevin VanOrd singled out the desire to recreate cinematic set pieces in his negative criticism of *Resident Evil 6* (2012). It is common to come across mixed feelings toward companies, such as Quantic Dream and Telltale Games, that try to elevate these configurations, making them one of their main engagement models. However, these studios have refined the QTE formula beyond the “hit the right button at the right time” design to model complicated action sequences. In contrast with a stable repertoire of mechanics, which allows players to tactically engage with a sequence of similar challenges, QTE action mappings introduce greater variety in depicted actions. Moreover, the intensity of the virtual actions can be echoed by cumulative inputs on the manipulation interface: players have to perform a streak of time-critical button-matching operations to complete a complex chase sequence in *Indigo Prophecy* (2005) or intricate finishing moves in *Asura’s Wrath* (2012). QTEs could also be seen as a form of “spectacle reward” that punctuates other challenges with visually impressive segments.

Carl Therrien

See also: Cutscenes

Further Reading

Dragon’s Lair Project website. Accessed September 23, 2020. Available at http://www.dragons-lair-project.com/.

King, Geoff, and Tanya Krzywinska, eds. *Screenplay: Cinema/Videogames/*

Interfaces. London: Wallflower Press, 2002.

Klevjer, Rune. “Cut-Scenes.” In *The Routledge Companion to Video Game Studies*, edited by Mark J. P. Wolf and Bernard Perron, 301–309. New York: Routledge, 2014.

Newman, James. “The Myth of the Ergodic Videogame: Some Thoughts on Player-Character Relationships in Videogames.” *Game Studies* 2, no. 1 (2002). Available at http://www.gamestudies.org/0102/newman/.

Surman, David. “Pleasure, Spectacle and Reward in Capcom’s Street Fighter Series.” In *Videogame, Player, Text*, edited by Barry Atkins and Tanya Krzywinska, 204–221. Manchester, England: Manchester University Press, 2007.

VanOrd, Kevin. “Resident Evil 6 Review.” GameSpot, October 1, 2012. Available at https://www.gamespot.com/reviews/resident-evil-6-review/1900-6397338/.

Quraish

Quraish is a real-time strategy (RTS) game with three-dimensional graphics developed by AfkarMedia in 2005. It was designed by Radwan Kasmiya and published by Dar al-Fikr in 2007. The name comes from “Quraish/Kuraish,” a famous Arabian tribe whose descendants include the Prophet Muhammad (570–613 CE) and the most famous Muslim leaders, the Omayyad and Abbasid caliphs. The game’s story is spread over four historical successive campaigns, covering Middle Eastern history before Islam until early Muslim conquests (600–638 CE), with each campaign consisting of a number of levels. Players must finish each level to play the next one.

The game’s first level, “First Encounter,” depicts life in Arabia before Islam, the first Arabian tribes’ coalition, the defeat of the Persian army at the battle of Dhi Qar in 609 CE, and the appearance of Islam. The second level, “Apostasy Wars,” is the story of the Wars of Apostasy and battles that reformed the Muslim state. The third level, the “Conquest of Persia Campaign,” follows the history of the Muslim conquests in southern Iraq and battles with the Sassanid Empire. The fourth level, the “Conquest of Syria Campaign,” tells the story of Muslim armies sweeping north of Arabia and beating Byzantine armies at the doors of Jerusalem. The narratives of every campaign are performed by non-Muslim characters, allowing players to experience different opinions about Muslim conquest wars. Even though *Quraish* features real historical characters, many top characters were not shown directly due to the sensitivity of showing images of the Prophet Muhammad and some of his major followers in media across the Middle East.

Players can play fictional and customized death matches, choosing from the main four factions of the game: Arabs, Bedouins, Byzantines, and Sassanids. Recommended system requirements for the game include Windows XP or Vista, a CPU speed of at least 1.8 MHz, 64 MB of VGA memory, at least 512 MB of RAM, and 1.2 GB available on the hard disk. Multiple versions of the game have appeared, including four independent Arabic versions, each of which includes a single campaign, and the Golden version, which includes all four campaigns and

English and Arabic interfaces. The game is the first Arab/Muslim strategy game and the first one to handle this period of history.

Radwan (RAD) Kasmiya

See also: Middle East

Further Reading

Statista Research Department. "Saudi Arabia: How Many Hours a Week Do You Spend Playing Video/Computer Games?" Statista, September 27, 2018. Available at https://www.statista.com/statistics/917546/saudi-arabia-number-of-hours-spent-playing-video-computer-games.

R

Race

Race in video games remains a hot topic both inside and outside the gaming industry. With the advent of phenomenally popular game series, franchises, and titles that feature must-play characters (MPCs) and playable characters (PCs) who are racially and ethnically diverse, it is clear that beyond the often rhetorical fever pitch, race matters in video games have undergone significant change. Among those games signaling a veritable paradigm shift in the medium's address of matters of race and difference are *Final Fantasy* (1987), *Prince of Persia* (1989), *Madden NFL* (1992), *Resident Evil* (1996), *Half-Life* (1998), *Tiger Woods PGA Tour* (1999), *Blade* (2000), *Halo* (2001), *Grand Theft Auto: Vice City* (2002), *Call of Duty* (2003), *Grand Theft Auto: San Andreas* (2004), *Men of Valor* (2004), *NBA Ballers* (2004), *NFL Street* (2004), *Afro Samurai* (2005), *50 Cent: Bulletproof* (2005), *Prey* (2006), *Gears of War* (2006), *Saints Row* (2006), *Mass Effect* (2007), *Def Jam: Icon* (2007), *Left 4 Dead* (2008), *Prototype* (2009), and *StarHawk* (2012), among others. Most striking of the notable changes these games share in terms of MPCs are more black, brown, and other minority characters positioned as central narrative agents who factor as essential elements in contemporary gameplay mechanics and strategies, game world designs, and gaming's favored genres that are especially pertinent for today's increasingly global, multiracial, and multicultural fan bases and intergenerational audiences.

As remarkable and welcome as this shift may be in the larger representational ecology of gaming's changing racial characters and avatar designs, at the same time, it is crucial not to lose sight of how much gaming's most successful narrative conceits and ludic gameplay procedures persist in replicating established and damaging discourses of race and difference so familiar in American popular cultural productions and entertainments such as film, television, and music. In fact, with gaming's growing market share of the larger global entertainment industrial complex, concerns and debates about race and representation in gaming abound, especially online and in digital media's proliferating gaming fora and websites, YouTube videos, and other platforms devoted to games and their rhetorics involving race. In fact, any cursory review of these issues, either online or in print, reveals simultaneously progressive and regressive discourses about race in gaming. If we consider some of gaming's most iconic and emerging lead characters, such as *GTA: San Andreas*'s African American character Carl "CJ" Johnson (the gang member protagonist), *GTA: Vice City*'s Italian American character Tommy Vercetti (the mafia protagonist); and *Prey*'s Native American character Domasi Tawodi (on the iconic side of the racial and ethnic MCP scale) and *Mass Effect*'s Black soldier, Commander John Shepard;

Men of Valor's Black Vietnam veteran, Dean Shephard; *Starhawk*'s Black gunslinger, Emmet Graves; and *Resident Evil 5*'s Black African woman bioterrorism fighter, Sheva Alomar (on the emerging side of gaming's MPC scale), we can grasp what is at stake in debates about gaming's powerful rhetorics where race and representation intersect.

I have argued elsewhere (Everett 2005; Everett and Watkins 2008) that much of gaming's representational economies are drawn from its literary, filmic, theatrical, and fine arts forebears. With whiteness as these media's racial default or norm for heroic character designs, it is hardly surprising that video games follow this successful binary normalization of heroic whiteness and its racial Other in gameplay worlds and ludic practices. So honest appraisals of gaming's redolent discourses of race and difference continue to demand scrutiny and challenge. A key repository for such contemporary critical interrogations is the internet, with its rapidly proliferating websites, blogs, vlogs, and other online fora dedicated to games.

Exemplary in this regard is "Moving Forward on Race in Games: Manveer Heir Speaks," an online article in which gaming journalist Brandon Sheffield conducts a revealing interview with Heir (a major game designer with Raven Software and BioWare). This blunt conversation echoes some key points about race in gaming that I have stressed elsewhere. For instance, concerning the nation's denial of persistent structural racism as a feature of U.S. society and culture, Heir is quoted as saying, "In general, people don't want to deal with race." He continues, "First off, I don't think the game having a Black character [should] be the selling point of the game. It needs to be an interesting game regardless of the protagonist. . . . So, I think that if you market your game as 'a game for Black people' or 'a game for Asian people,' it is going to flop the same way most of the games for women flop" (Sheffield 2011).

That this game designer views increased racial diversity in gaming's character designs not as tokenism but as central to the medium's future growth, development, and continued success is significant and portends well for new gaming design models and character development. Most striking in contemporary conversations about racially diverse MPCs constituting a necessary industry game changer is the realization that expanding stories and heroic characters, who better reflect all gamer communities and constituents rather than the dominant white male archetype, is simply smart business sense. As Heir puts it, "It's not video game affirmative action. It's about actually pushing our medium to make better games, to tell better stories in our games" (Sheffield 2011).

Not surprisingly, another key consideration that Sheffield and Heir explore is mainstream society's general disavowal or repression of how race and racism in gaming get maintained and manifested in other modes and codes of character differentiation. Heir remarks cogently on the types of race and ethnic displacement occurring in popular gaming narratives, observing, "You can think of fantasy games where the dark elves, you know, the Drow [in *Dungeons & Dragons*' massively multiplayer online role-playing games] MMORPGs, were always looked upon. . . . They were the Black people of the fantasy world, right? And if you played the dark elves, you were treated like garbage by many of the townspeople. So, my only question is . . . why can't we do that when we're actually talking about real people?" Sheffield gets to the heart of the matter when he acknowledges that game designers, gamers, and others can subvert the issue by resorting to fantasy and alien characters of ambiguous racial origin and background. As Sheffield points out, “It’s an easier pill for everyone to swallow because it’s like, ‘well, I’m not saying this about any person.’ It’s so ambiguous. People are afraid to make any kind of direct statement about anything” (Sheffield 2011).

Another particularly illustrative case is the phenomenally popular 2001 version of the 1994 *Warcraft: Orcs and Humans* fantasy MMORPG. Rebooted and renamed the *World of Warcraft* (*WoW*), here is a transformative game franchise that indirectly engages issues of race and difference, although it foregrounds racial matters directly. After all, its fictional Azeroth game world is populated by an array of fantastic nonhuman MPCs—namely, the Orcs, Trolls, and Dwarves—and their missions entail joining forces with or combating MPC human characters in game quests between the game’s warring Alliance and Horde factions. *WoW*’s striking appeal, arguably, trades largely on its not-so-covert racial discourse with Cold War and War on Terrorism militaristic overtones (the Allies versus the Axis). Updated to reflect the post–September 11 war on terror Western response, it is not unreasonable to see *WoW*’s fantasy war genre game universe as a mythological fantasm conjoining U.S. World War II and Cold War mythemes and the twelfth- and thirteenth-century religious crusades with a bit of colonial Orientalism added to encompass a consumable history of premodern and modern warfare, or a good-versus-evil contest of wills. This is what is so insidious about the codification of race and racial difference in these hugely popular games about race.

We can see similar narrative trends in earlier game titles such as *Donkey Kong* (1981), to cite a classic game exemplar. Clearly based on the film *King Kong* (1933), this beloved game codifies socially agreed-on discourse about Black males’ rapacious desire for innocent and helpless white female sexuality. Although no one can miss the fact that Kong is analogous to those African states known as the Republic of Congo/Kongo, one can easily miss the fact that the term *Kongo* in Japanese refers to an indestructible one. That *Donkey Kong* is Japanese game designer Shigeru Miyamoto’s creation clearly muddies the issue somewhat. Still, the fact that a gorilla, signifying Africanness or blackness, has captured the white princess who must be rescued by Mario, signifying Italianness or whiteness, patently trades on familiar racial scripts that should not be discounted or ignored. Games, like their narrative progenitors—literature, pulp fiction, theater, radio, and television, for example—draw from a history of racist and racialized narratives and representations that make gaming’s procedural rhetoric, to borrow Ian Bogost’s useful term, meaningful and intelligible.

Another familiar and abstracted racial script that informs gaming’s popular narratives of conflict, death, and destruction is the fantasy character constructs of nonhuman or unhuman zombies, who make perfect evil antagonists for gamers to annihilate reflexively and pleasurably. And although game zombies may be MPCs as well as NPCs, they are often codified or marked as racially and ethnically diverse and Other, but in the main, they tend to signify racial blackness. Nowhere is this practice more clear than in Capcom’s *Resident Evil 5* (2008) with its zombie-like humanoid enemies called the Majini, a Swahili word meaning “evil spirit.” This seventh installation of the lucrative *Resident Evil* game franchise stirred up a major controversy because of its blatantly racist depiction of a horde of man-eating black Majini juxtaposed with the heroic white human MPC Chris Redfield and his bad-ass Black human MPC sidekick of African descent, Sheva Alomar, and its setting in some African village. Websites such as GamePolitics.com, WallStreetJournal.com, BlackLooks.org, TheZombiephiles.com, and many, many others had a field day with the controversy when Capcom unveiled its game trailer at the 2007 E3 convention. Apparently, no one was buying the company's good, black, scantily clad babe heroine as a sufficient counterbalance to the horde of bad Black boyz in the jungle to deflect the charges of racism leveled at Capcom and *Resident Evil 5*.

Especially meaningful here are Manveer Heir's honest and informed observations about race and gaming from inside the industry's inner sanctum. Heir, who is of Indian descent, grabs our attention with such telling remarks as this:

> I mean, it is an uncomfortable topic, especially in the U.S., where racial issues are always going to be a hot-button issue, from my perspective—just on the way the country was founded, right? . . . While I love plenty of games that use these alien and fantasy characters, I don't even think they go in saying, "I want to make this commentary on this culture." They're just like, "We have these fantasy characters," and once they've made those races or whatever they have, oftentimes, they just start making parallels to what you see in life. . . . "Well, this race is like this race." You know, "This is the Asian race. Let's do it this way." I think it's actually kind of accidental. I'm not really sure. I haven't been a creator of fantasy worlds, but that seems to be the way it always happens to me. . . . And oftentimes it will feel like an entire race is pigeonholed. (Sheffield 2011)

He adds further, "I don't personally believe your game is going to sell worse if the protagonist's skin color changes and everything else in the game was the exact same. Nothing else changed about the game. All you did was default the white to the black guy [or any other race]—that's the easiest route."

Sheffield and Heir's conversation reflects well the discursive range of expressed concerns about race in contemporary gaming, from activist gaming journalists off-line and online eager to call out racist practices in the industry, to annoyed gaming fans—of all races—ranting and railing against the politically correct benighted fools who see racism everywhere, to the game industry writers and representatives who claim to "be afraid of putting characters of other ethnicities into their games because they don't want to get judged for it by the ethnic groups that they're representing" (Sheffield 2011). On the one hand, perhaps some of the complaints about racism in gaming go too far, and on the other hand, it is absolutely the case that the gaming industry's self-policing tactics do not go far enough to address this very real issue.

Our concern with race in gaming culture is not a trivial matter, far from it. We know that games are particularly adept at teaching all manner of lessons, both serious and innocuous alike. As Ian Bogost points out, games make an argument, "and players unpack that argument through play" (Bogost 2008, 130). What we need to ask ourselves as a society is, "What kind of racial arguments do we want to unpack time and again in the games we play?"

Finally, since Michel Marriott's groundbreaking 1999 *New York Times* article exploring issues of race in computer games, there has been both progress and retrenchment where matters of race and gaming intersect. It is hardly surprising that discourses of race and difference in gaming have not veered too far from those highlighted in the *Times*, despite the fact that a significantly large fan base for games is constituted by gamers of color. Still, there has been progress in the years since Marriott wrote about the prevalence of high-tech blackface and Orientalism in gaming. Game designers are increasingly integrating their ranks with Black and other minority programmers and game narratives, characters are increasingly racially and ethnically diverse, and games feature many more MPCs in integrated game worlds and universes. At the same time, it is clear that the gaming industry and the gamers themselves need to do better because, after all, playing with race is serious business.

Anna Everett

Further Reading

Bogost, Ian. "The Rhetoric of Video Games." In *The Ecology of Games: Connecting Youth, Games, and Learning*, edited by Katie Salen, 117–139. Cambridge, MA: MIT Press, 2008.

Ellis, Jason. "The First 11 Black Videogame Stars." Microsopiq, February 8, 2007. Available at http://microscopiq.com/2007/02/first-black-videogame-stars.

Everett, Anna. "Serious Play: Playing with Race in Contemporary Gaming Culture." In *Handbook of Computer Game Studies*, edited by Joost Raessens and Jeffrey Goldstein, 311–325. Cambridge, MA: MIT Press, 2005.

Everett, Anna, and S. Craig Watkins. "The Power of Play: The Portrayal and Performance of Race in Video Games." In *The Ecology of Games: Connecting Youth, Games, and Learning*, edited by Katie Salen, 141–164. Cambridge, MA: MIT Press, 2008.

Kinzel, Lesley. "Shepard Aint White: Playing with Race and Gender in *Mass Effect.*" Two Whole Cakes, June 21, 2011. Available at http://blog.twowholecakes.com/2011/06/shepard-aint-white-playing-with-race-and-gender-in-mass-effect/.

Marriott, Michel. "Blood, Gore, Sex, and Now Race: Are Game Makers Creating Convincing New Characters or 'High-Tech Blackface'?" *New York Times*, October 21, 1999: D7.

"Resident Evil 5 Race Controversy Resurfaces." GamePolitics.com, June 20, 2008. Available at http://gamepolitics.com/2008/06/20/resident-evil–5-race-controversy-resurfaces.

Sheffield, Brandon. "Moving Forward on Race in Games: Manveer Heir Speaks." Gamasutra, August 5, 2011. Available at http://www.gamasutra.com/view/feature/6450/moving_forward_on_race_in_games_php.

"*Starhawk*: Behind the Scenes: A New Universe." IGN, July 15, 2011. Available at http://www.ign.com/videos/2011/07/15/starhawk-behind-the-scenes-universe-video.

White, Darion. "Why Are Black Game Characters Failing the Audience?" *Edge* at Next-Gen.Biz, February 8, 2009. Available at http://www.next-gen.biz/features/why-are-black-game-characters-failing-audience (site discontinued).

Racing Games

The term *racing games* generally refers to games that provide the player with competitive gameplay using vehicles involved in a race; players compare their speed against other players or non-player characters (NPCs) riding in similar vehicles as opposed to *driving games*, which are more about vehicle control. Because racing games usually have a relatively simple game mechanic and often very intuitive gameplay, racing games were among the earliest video games developed; the first commercial racing games were Atari's *Gran Trak 10* (1974) and its two-player version, *Gran Trak 20* (1974). The games adopted a top-down view, and their sprites had simple shapes: a series of dots demarcated the racing track, and a rectangle represented the player's vehicle. The games were released as arcade games and were among the first with read-only memory (ROM) data storage. In the games, the player controls his or her vehicle with a steering wheel, two foot pedals (an accelerator and a brake), and a gear shifter. Another early racing game, Atari's *Indy 800* (1975), was notable for being the first eight-player arcade game.

At first, the major game platform for racing games was the arcade machine. It was a relatively easy genre to develop because the abstraction and re-creation of the practical experience on which it was based required only a limited number of simple objects on-screen and no complicated game mechanics. Racing games were the first arcade games to offer a first-person perspective—for example, in *Night Driver* (1976), *Datsun 280 Zzzap* (1976), *Night Racer* (1977), and *Speed Freak* (1978)—making the experience more immersive.

In the beginning of the 1980s, the growth of the game industry and the advent of color display arcade machines served as momentum for the rapid evolution of racing games. The evolution was set off by Japanese game developers; SEGA's *Turbo* (1981) and Atari's *Pole Position* (1982) were the first full-blown racing games, providing competitive gameplay and more sophisticated graphics than earlier games. After these two games, the development of racing games was mostly focused on the visual quality rather than new game mechanics. At that time, new advancements in the genre were found in arcade games because of the graphical and interactive limitations of home video game consoles. However, *Revs* and *Enduro* reenvisioned racing games for consoles. *Enduro* (1983), published by Activision for the Atari VCS 2600, had a weather system and leader boards. *Revs* (1984), developed by Geoff Crammond and published by Acornsoft for BBC Microcomputer System, is considered as the first serious driving simulator. Although the graphical quality of the game was not enough to compete with other arcade racing games, the game had realistic game mechanics and a user interface, with various opponent drivers having different artificial intelligence (AI).

SEGA's *Out Run* (1986), developed by Yu Suzuki, had impressive sprite-scaling graphics and animation implemented by the best graphic processing technology of the time, improved gameplay, and a force-feedback steering wheel. The game was successful worldwide and showed the future direction of innovation for racing games: better visual effects and more speed. *Final Lap* (1987), developed by Namco and published by Atari Games in 1987 for arcade game machines, was an unofficial sequel to *Pole Position*. In the game, up to eight players were able to participate in a circuit. It had relatively realistic formula machines and detailed depictions of Formula One team identities and billboards. *Hard Drivin'* (1988), developed by Atari Games for the arcade, was the first racing game with three-dimensional filled-polygon graphics. SEGA's *Super Monaco GP* (1989) and Papyrus's *Indianapolis 500: The Simulation* (1990) impressed racing game fans with the sophisticated control mechanics and detailed and splendid visual quality.

In October 1992, Suzuki released *Virtua Racing*, another monumental racing game, which was the first racing game with fully three-dimensional graphics. All objects, including the player's vehicle, were filled-polygon graphics, and the player could manipulate the camera view in the game. In addition, the game realized most of what makes a modern racing game. The game was a huge success globally and significantly influenced the racing games that followed.

Suzuki's next titles included the *Daytona USA* series and *SEGA Rally* series, which improved the game system and visual quality while keeping the basic elements of *Virtua Racing*. The advent of 32-bit video game consoles equipped with an accelerating graphic chipset for three-dimensional graphics, such as the SEGA Saturn and the Sony PlayStation, served as the momentum of the further evolution of racing games. Because these consoles' technological performance could equal that of arcade platforms, game developers left the declining arcade market and began targeting home systems for their releases. Namco's *Ridge Racer* (1994), ported from the arcade version and released on the same day as the PlayStation, is an early example. After the game's release, most arcade racing games started to be ported to consoles, such as SEGA's *Daytona USA* for the SEGA Saturn in 1995 and Namco's *Rage Racer* for PlayStation in 1996.

By 1997, with the release of Polyphony Digital's *Gran Turismo*, the main platform for racing games had shifted over to home console systems. Since then, the evolution of racing games has been focused on graphic quality and more specialized gameplay for consoles rather than arcade-style gameplay. For example, the *Colin McRae Rally* series deals with strategic and realistic tuning of rally cars, and in the *Project Gotham Racing* series, players can buy their cars and customize them with items purchased using in-game points, which are gained through repetitive gameplay; such gameplay examples were not found in arcade games.

Since the mid-2000s, racing games have been mainly categorized into two subgenres: racing simulators and casual racers. *Racing simulators* refer to racing games that focus mainly on the detailed depiction of cars and environment, vivid weather effects, and realistic gameplay adopting advanced physics engines. The objective of these games is to recreate the driving experience as realistically as possible. With racing simulators, players can virtually experience the driving of their dream cars. In the gameplay of those games, almost all detailed driving maneuvers are implemented, and the player's driving technique is tested. Also, these games provide the player with very detailed and strategic customization systems, including all interior parts and exterior accessories that influence performance of the car. The best-known examples are the *Gran Turismo* series and the *Forza Motor Sport* series.

Casual racers refer to racing games that mainly focus on easy and entertaining gameplay rather than complicated customization and detailed driving skills. The objective of these games is to provide the player with an exciting experience in a short time. In these games, players can experience skillful driving and exquisite scenery using simple controls without needing to spend much time learning the skills. Also, some casual racers include unique extra gameplay; for example, the *Burnout* series provides crash competitions, whereas in *KartRider* (2004), players can attack other players with various items gained through gameplay. Games in the *Crazy Taxi* series, *Burnout* series, and *KartRider* can be categorized as casual racers.

Taiyoung Ryu

See also: *Mario Kart* Series

Further Reading

Parker, Jim. *Start Your Engines: Developing Driving and Racing Games*. Scottsdale, AZ: Paraglyph Press, 2005.

Togelius, Julian, Renzo De Nardi, and Simon M. Lucas. "Towards Automatic Personalised Content Creation for Racing Games." *2007 IEEE Symposium on Computational Intelligence and Games*, Honolulu, HI, 2007, 252–259. Available at https://ieeexplore.ieee.org/abstract/document/4219051.

Reading Video Game Imagery

Video games are a form of visual art and communication, and, as such, they tend to follow certain visual conventions that are often assumed to be understood by the player. Even the mere playing of a game requires certain reading strategies, most of which a player will have picked up from past experience.

First, a player must gain an understanding of the world of the game and its visual space: the dimensionality of the world being represented (which can two dimensional, three dimensional, or some combination of the two) and the division between the diegetic space of the game world and nondiegetic elements, such as informational graphics (e.g., scores and lives remaining indicators), title screens, decorative graphics, and so forth. Some games, however, play with this distinction, including *Starhawk* (1977), in which attacking ships sometimes shoot away the digits in the player's score, and *Eternal Darkness: Sanity's Requiem* (2002), which deliberately tries to confuse the player as a part of the horror effect it is trying to create (e.g., the game may make it appear that bugs are walking across the screen).

The spaces of the game world, and how to navigate them, must be understood. The player must be able to identify the avatar that he or she is controlling or, in the case of multiple avatars, understand which one is being controlled and how to switch between them. Game world affordances must also be recognized—that is, which graphics represent the objects, devices, and vehicles that can be used by the player and how they are used. It is necessary to identify other characters and distinguish between those that help and those that hinder, and players must often make such distinctions rapidly. In general, graphical configurations must be read for the player to understand what options and what kind of interactivity are available at any given moment during gameplay.

For games in which navigation is required, how to interactively change the point of view being presented to the player becomes important as well as an understanding of how spaces change as one's point of view changes. Most three-dimensional games construct a standard Euclidean space that behaves similar to the lived-in spaces of the physical world, but games can play with such notions of space and construct counterintuitive structures that players must first learn to identify and then to navigate. Finally, the visual interpretation of the game's spaces and even dimensionality may change during gameplay, requiring the player to learn how and why such changes occur and to recognize them when they do. For example, the graphics in *Echochrome* (2008), *Monument Valley* (2014), and *Monument Valley 2* (2017) require players to alternate between interpreting spatial structures in three dimensions globally (for the turning of structures in three-dimensional space) and interpreting the same structures two-dimensionally locally (points that look like they connect actually do connect, so far as the movement of the avatar is concerned).

As video game graphics grow more complex and experimental, recognition of such elements as foreground, background, usable objects, passageways, and the avatar may become part of a game's challenge, in addition to all the usual challenges involving speed, timing, and skill. Although well established, the graphical conventions of video games are still evolving, and game designs can always make use of the assumptions they generate to either help players play or make a game more challenging by breaking these conventions.

Mark J. P. Wolf

See also: Abstraction; Game Design; Graphics

Further Reading

Wolf, Mark J. P. "Abstraction in the Video Game." In *The Video Game Theory Reader*, edited by Mark J. P. Wolf and Bernard Perron, 47–65. New York: Routledge, 2003.

Reception Theory

Reception theory describes the multiple methods and ways of conceptualizing the interpretative process that occur between text and reader, medium and audience, and, in the case of video game studies, game and player. The concepts of reception theory originate in literary theory and semiotics but have benefited from contributions from multiple fields, including communication, film, media studies, sociology, anthropology, and rhetoric. Theoretical work across these fields provides tools to explain how the sender and receiver of a message co-create meaning through the experience of communication.

For video games, reception theory provides scholars with an ability to explain how game design (aesthetics, production practices, rules, narrative, etc.) combines with sense making (or ideation) that occurs in the player's mind to create the meaning of the game. Those that employ reception theory typically focus on either an analysis of the "implied reader" found in the game design or the "actual reader" that is documented through empirical analysis of gamers and their gaming context, communities, and explanations of their gameplay. Though the focus and objects of analysis may be different between the two approaches, they are united by their insistence that the meaning of video games is found in the dialog between game design and gamer.

IMPLIED READER APPROACHES

Scholars have often relied on psychological approaches to discover the *implied reader* within video game studies. Efforts to employ these approaches emerged in reaction to the invention of cinema. At that time, religious groups and advocates for censorship believed that movies corrupted the minds of impressionable audiences. In some extreme cases, mass media texts were blamed for race riots. Researchers thought that the movies, through their unique viewing experience and immersive narrative continuity, positioned audiences to adopt the perspective of the implied reader and inspired lewd behavior. Similar reasoning generated claims that video games were responsible for the violent shootings at Columbine High School in 1999 and at Virginia Tech University in 2007. In both cases, pundits and politicians looked to blame media companies for human tragedies.

Analysis of the implied reader of video games can be illuminating for its ability to explain the structural realities of gameplay. Elizabeth Evans's research (2016) on the implied reader of mobile device casual games is one example of an exceptional study. Evans describes how the games are designed to make the game players "impatient" as they attempt to "level up" throughout the game. The psychology of the game attempts to provoke anxiety in the hopes that gamers will pay money to avoid delays and relieve the tension. Though the implied reader of the game is "impatient," Evans points out that "these strategies are not dictatorial and can be circumvented (Evans 2016)." Her acknowledgment of the difference between the "implied reader" and the "actual reader" is a key distinction that is often ignored when cultural critics attack the psychology of video games. For example, Lieutenant Colonel Dave Grossman and Gloria Degaetano provided a link between violent video games and behavioral conditioning. Grossman and Degaetano have argued in their book *Stop Teaching Our Kids to Kill* (1999) that the experience of playing a first-person shooting game is similar to the experience of military training. Claims like this, although helpful for politicians and censorship groups, assume that all audiences identify with the implied reader. Focusing too harshly on the implied reader often ignores the more complex social and cultural meaning-making that occurs with video games.

ACTUAL READER APPROACHES

Studying the *actual reader* in video games means employing the methods of sociology and ethnography. The emphasis on sociological factors for reception theory began with the establishment of the first sociology department at the

University of Chicago in 1892. The early research of the Chicago School looked at social groups, such as urban juveniles, and attempted to understand how media texts reinforced or mediated their social interactions and community standards. Explaining the function of media within a social group became known as *functionalism*. Video game research still relies on this concept when considering the social interactions between groups of players in massive multiplayer environments and other gaming communities.

In England, in the late 1960s, the Birmingham School of Contemporary Cultural Studies inspired a paradigm shift through the work of Stuart Hall, Richard Hoggart, and E. P. Thompson. The research from these scholars was largely a reaction to the Frankfurt School and focused on individuals and small groups that actively used mass culture as part of their everyday lives. Research on these groups demonstrated that audiences made informed, even political, decisions about their cultural choices. Hall showed that audiences use cultural objects in ways that the producers of those objects never intended. Using the language of semiotics, he described a process of encoding/decoding in which a cultural object, like a video game, is first created with a particular ideological framework and then received in an ideological context that is further contextualized by the receiver's cultural experiences.

One area where this approach has been fruitful is in analysis of the use of casual games in social settings. In interviews and observations that document when, where, and how gamers play mobile casual games, Stephen Rea (2017) has demonstrated how this gameplay fits within Korean "mass play culture." By analyzing the *actual reader* of casual games, in a specific context, Rea complicates established perceptions about socializing and gameplay. In Rea's study, the context of gameplay, waiting for friends, commuting, or killing time while in line, reframes the structure of casual games. The "punctuatedness" of casual games, which Evans has argued is designed to create "impatience," is recontextualized to make casual games a relief from boredom and the opposite of anxiety-inducing. Furthermore, the game design correlates with Korean gaming and socializing traditions, making casual games a sophisticated form of social gaming in the country. In both examples of research on mobile casual games, the scholars acknowledge both the implied reader and actual reader as equal parts of the meaning-making process. Applying reception theory is an effort to account for this fascinating dynamic.

Ethan Tussey

See also: Addiction; Censorship; Education (General); Education (Religious); Morality and Ethics; Phenomenology; Procedural Rhetoric; Violence; Visual Literacy

Further Reading

Barbatsis, Gretchen. "Reception Theory." In *Handbook of Visual Communication: Theory, Methods and Media*, edited by Ken Smith, Sandra Moriarty, Gretchen Barbatsis, and Keith Kenney, 271–293. New York and London: Routledge, 2005.

Brooker, W., and D. Jermyn, eds. *The Audience Studies Reader*. New York: Routledge, 2003.

Evans, Elizabeth. “The Economics of Free: Freemium Games, Branding and the Impatience Economy.” *Convergence* 22, no. 6 (2016): 563–580.

Grossman, Dave, and Gloria Degaetano. *Stop Teaching Our Kids to Kill: A Call to Action against TV, Movie & Video Game Violence*. New York: Crown Publishers, 1999.

Hall, Stuart. “Encoding/Decoding.” In *Culture, Media, Language*, edited by Stuart Hall, D. Hobsen, Andrew Lowe, and P. Willis, 117–127. New York: New York University Press, 1980.

Jenkins, Henry. “The War between Effects and Meanings: Rethinking the Video Game Violence Debate.” In *Fans, Bloggers and Gamers: Exploring Participatory Culture*, 208–221. New York: New York University Press, 2006.

Rea, Stephen C. “Mobilizing Games, Disrupting Culture: Digital Gaming in South Korea.” In *Mobile Gaming in Asia: Politics, Culture and Emerging Technologies*, edited by Dal Yong Jin, 73–89. Dordrecht, Netherlands: Springer, 2017.

Staiger, Janet. *Media Reception Studies*. New York: New York University Press, 2005.

Reddy, Siobhan (1979–)

Siobhan Reddy is a South African–born game designer working in the United Kingdom. She is best known for her work on *Little Big Planet* (2008) at Media Molecule, where she serves as studio director.

Unlike many game creators in the industry, Reddy did not come to the industry already a gamer. Rather, her creative energies were honed in the independent music scene, film, and fanzines. When she was eighteen, she packed up her life in Australia and moved to the United Kingdom, where a friend suggested that she enter the game development industry. Her first opportunity opened with a position as a production assistant at Perfect Entertainment, the company that created Terry Pratchett’s *Discworld* games. From there, she moved to Criterion in 1999, where she worked on the *Burnout* franchise, and then left to cofound Media Molecule in 2006, launching *Little Big Planet* and *Tearaway: Unfolded* (2015). *Little Big Planet* won multiple awards on release as a physics-based puzzle platformer; people could play the game, create their own levels, and share created levels with others.

The success of Media Molecule highlighted Reddy in the game industry, and she took her newfound fame to advocate for more women in the game development industry. She notes that in her early years, she worked with strong women leaders at both Perfect Entertainment and Criterion, which shielded her in some ways from the gender disparity of the industry. In 2013, the BBC named Reddy one the 100 Most Powerful Women in the UK, and the same year, Qantas named her Australian Woman of the Year, which Reddy read as a call to use her visibility to advocate for women in game culture and development. This call was strengthened by her involvement on the BAFTA Games Committee, where she analyzed the statistics on women in games. Games, believes Reddy, is the quintessential medium of our time and thus should be a place for everyone.

Reddy's work in game development and as a game advocate has also earned her recognition and awards from Microsoft Women in Gaming (2009), *Fortune* magazine's 10 Powerful Women in Gaming, and installation in the UK Women in Game Hall of Fame.

Jennifer deWinter and Carly A. Kocurek

See also: United Kingdom

Further Reading

Serrels, Mark. "The Invisible Woman." Kotaku, January 31, 2014. Available at https://www.kotaku.com.au/2014/01/the-invisible-woman/.

Regionalization. *See* Localization

Remediation

In their book *Remediation: Understanding New Media* (1999), Bolter and Grusin define *remediation* as the process whereby one medium imitates another. New media usually hope to heighten their level of immediacy (also referred to as *medial transparency* or *realism*) by imitating the representational affordances of older media that have already been socially accepted as transparent (54–55). In addition, they attempt to borrow the cultural capital of more established media (69). Although immediacy seems to be the main driving force behind remediation, some media use remediation to highlight the mediated nature of the representation. The two authors call this latter effect *hypermediacy* (31).

Media are enmeshed in a network of remediation, which entails a new medium emerging from already existing ones. Video games are no exception, as evinced by the relation between one of the earliest gaming platforms accessible to the general public, arcade games, and their predecessors, electromechanical games. The relation between the two ludic media faithfully reflects the promise of betterment that lies at the heart of remediation. Arcade games imitate the format of electromechanical games (devices with a front control panel and a physical game world behind a transparent screen), but at the same time, they solve many of the issues characteristic of electromechanical games, such as the need to be operated mechanically and to be reset between play sessions as well as their difficult maintenance (Wolf 2012, 184–185). Arcade games also offer more functional gameplay activities, such as shooting and racing, than electromechanical games did.

Nevertheless, video games are not a fully interactive medium. Arcade games and, later, console games feature many noninteractive interludes that link together different levels or stages, offer ludic reward, and often serve a narrative function (Blanchet 2012, 151). These noninteractive moments are called *cutscenes*, and they rely on the remediation of other media, such as film, photography, text, comics, and television. Some of the earliest cutscenes can be found in *Pac-Man*

(1980) and *Donkey Kong* (1981), and since then, they have appeared in video games across platforms. In the 1980s, the complexity and length of cutscenes depended on the storage capacity of the read-only memory (ROM) used by the platforms. Nintendo Entertainment System (NES) games, whose ROM cartridges offered developers little space, featured minimal, static and text-based cutscenes with no voiceover (Klevjer 2014, 302), while laserdisc games, benefiting from more storage capacity, used a significant length of realistic prerecorded video during gameplay. As a result of the cinematic nature of the prerecorded content, these latter games displayed a higher level of verisimilitude, which made them similar to feature films or animation. Laserdisc games fall under two categories: either action games with computer-generated content (e.g., playable entity, enemy characters, ludic objects) on top of prerecorded cinematic content (see, e.g., *Astron Belt* [1983]) or games that feature a branching narrative, as exemplified by *Dragon's Lair* (1983) (Wolf 2007, 99–100). *Dragon's Lair* used hand-drawn animated pre-rendered cutscenes that amounted to a length of twenty-two minutes. These animated cutscenes were played back by the arcade game, depending on whether the player managed to press the correct direction or attack button at the right time (Perron 2007, 128). Due to their minimal player involvement, the little variation between different game sessions, and the strong feeling of authorial presence, these games were also called *interactive movies*.

In the 1990s, the popularization of CD-ROMs enabled console and computer games to raise their cutscenes to higher cinematic standards (Klevjer 2014, 302). One type of cinematic interlude that CD-ROM games featured was the live-action cutscene, which used real actors on real sets or on green screens that were played back at plot bottlenecks (Blanchet 2012, 152–153; Egenfeldt et al. 2008, 181). Live-action cutscenes were most common in the interactive movies of the early 1990s (see *Night Trap* [1992], *The 7th Guest* [1993], *Under a Killing Moon* [1994], and others) (Perron 2007, 129), but they were also featured in other games of different genres, such as the real-time strategy (RTS) game *Command and Conquer* (1995) and the survival horror game *Resident Evil* (1996).

The introduction of 3-D-rendering technology in video games brought greater verisimilitude to cutscenes, making them more cinematic, and game developers could also use game engines to produce the cutscenes in real time rather than pre-rendering them. Games such as *Metal Gear Solid* (1998) and *Silent Hill* (1999) made extensive use of pre-rendered cutscenes in an attempt to imitate the visual aesthetics and narrative affordances of cinema. Moreover, besides remediating film in their cutscenes, 3-D rendering made it possible for games to use more cinematic conventions during gameplay as well. The aforementioned *Resident Evil* and *Silent Hill*, as well as most other survival horror games of the 1990s and early 2000s, employed a variety of cuts and fixed angles during gameplay (Rouse 2009, 23). However, this overuse of cinematic language ended up undermining the realism of the video games and, in turn, led to hypermediacy.

The advent of 3-D rendering in video games brought the intermedial relation between games and cinema to a new level, but it also paved the way for other strong intermedial bonds. The first-person shooter (FPS), a hallmark genre of video games, was an attempt of action games in the early 1990s to imitate the representational and simulational affordances of virtual reality (VR) (Pinchbeck 2013, 18). Despite the fact that VR gear was almost inaccessible to the average user, VR was regarded as an immersive ideal. Consequently, by employing a subjective camera that could be freely moved into any direction, 3-D-rendering technology enabled FPSs such as *Wolfenstein 3D* (1992) and *DOOM* (1993) to imitate VR, at least partially, and to provide players with a level of realism higher than earlier 2-D side-scrolling shooting games.

The subsequent progress of gaming platforms after the 2000s means that most triple-A games have their cutscenes rendered in real time, as you play, by the game engine. Real-time rendering has allowed game designers to make cutscenes more interactive, either through quick time events (as in the *God of War* series) or through control, albeit restricted, of the camera (as in *Metal Gear Solid 5: The Phantom Pain* [2015]). In doing so, game developers have managed to blend together cutscenes and gameplay in a more seamless manner and, consequently, have made a step forward in offering players a more immersive gameplay experience (Klevjer 2014, 303).

Film is not the only medium whose remediation has led to games' attainment of a high degree of narrativity. As Henry Jenkins observes, one of the means employed by games to convey stories is the embedded narrative that consists of the sum of remediated documents scattered around the game world (Jenkins 2004, 126). By finding and reading or viewing these documents, players piece together the backstory of the events in which they are enmeshed. These documents remediate a variety of media, such as letters, diaries, voice mails, e-mails, photographs, paintings, VHS cassettes, and more. The fact that in many cases we are dealing with the remediation of analog technologies is not arbitrary; through such remediations, video games try to borrow the sense of materiality characteristic of analog media and, consequently, to convey "a sense of real perceived as lacking in digital media, yet central to a generically-significant impression of embodiment" (Kirkland 2008, 115). A good example of this use of remediated analog media is the CD-ROM adventure game *Myst* (1993), whose network of analog remediations is constitutive of the game's story, which the player unravels by exploring game space.

Although video games, comic books, and manga have always been involved in exchanges of narrative content (Picard 2007, 297), games have been reluctant to imitate their aesthetics to the extent that they have done with films and VR. There are, nevertheless, a few noteworthy exceptions in the gaming industry (Hanson 2012, 128). One of the earliest uses of panels and speech balloons can be traced back to the Apple II adventure game *Accolade's Comics* (1987), in which the challenge for the player is to select the right answer in the speech balloons during some moments of gameplay. Another game that remediates comics is *Comix Zone* (1995), a beat 'em up game released for the SEGA Genesis, in which the playable character must move from one panel to another to defeat his adversaries. The game makes complete use of the conventions of comics in that the dialogue is rendered in speech balloons, the narrator's input is provided in yellow captions in the upper left of the screen, and onomatopoeic sounds are rendered in different fonts. In the case of 3-D games, the most prominent cases of comic book remediation are the games *Max Payne* (2001) and *XIII* (2003), whose scripted narratives are delivered through cutscenes that represent comic strips.

Television is yet another medium whose form has been less present in video games, despite the circulation of content from video games to TV (and vice versa)

(Picard 2007, 298). Some games have adopted the episodic nature of TV series. *Resident Evil: Revelations* (2013) structures the narrative of its levels as episodes that end with cliff-hangers, and there is a recapitulation of the previous events at the beginning of each new episode. Other recent video games, including *Life's Strange* (2015), *Resident Evil: Revelations 2* (2015), and *Hitman* (2016), have been released episodically at intervals that range from one to two months.

Video games have also been the object of remediation. Throughout the years, cinema and video games have developed a strong intermedial bond, with films sometimes remediating video games. This is most conspicuous in video game adaptations that, besides adapting the games' narratives to the linearity of film, also try to imitate the visual representation of particular game mechanics. For example, the feature film adaptation of *DOOM* (2005) remediates the first-person perspective of the game by employing subjective camera in long takes that show only the protagonist's weapon. Another video game adaptation, *Max Payne* (2008), uses a variety of filters and special effects to represent the iconic bullet-time mechanic of the game. In addition to this, video game aesthetics have crossed the boundaries of video game adaptations and can be found in films relying on other sources. A relevant example in this respect is *The Expendables 2* (2012), where the representation of headshots strongly resembles that of video games.

The cultural capital enjoyed by video games has led to their canonization. Games that were regarded as mere entertainment products upon their release are now classics that must be made accessible to newer generations who are unfamiliar with the games or their respective gaming platforms. One of the earliest cases of self-remediation can be found in Cyan's 1990 *Cosmic Osmo*, whose game world contains two arcade games, *Ship Chip Lander* and *RubberGut*, as well as a reference to itself on a monitor (Wolf 2011, 25). Other instances of games remediating other games can be found in *DOOM 3* (2003), *Metal Gear Solid 4: Guns of the Patriots* (2008), and *Uncharted 4* (2016), in which the players can play earlier games indirectly, via the avatar, on old gaming platforms that are diegetically present in the game world. For example, during *Uncharted 4*'s "Chapter 4: A Normal Life," the player controls Nathan Drake, who is playing *Crash Bandicoot* (1996) on the PlayStation. This remediation functions as a diegetic foreshadowing and ludic tutorial for a chase sequence that will occur later in the game. In a manner similar to the remediation of film at the turn of the millennium, by remediating older canonical games, new ones borrow their cultural capital and construct a tradition that lends them legitimacy.

Andrei Nae

See also: Adaptation; Metagames; Video Games within Video Games

Further Reading

Blanchet, Alexis. "Cut-Scenes." In *Encyclopedia of Video Games: The Culture, Technology, and the Art of Gaming*, edited by Mark J. P. Wolf, 151–154. Westport, CT: Greenwood Press, 2012.

Bolter, Jay David, and Richard Grusin. *Remediation: Understanding New Media*. Cambridge, MA: MIT Press, 1999.

Egenfeldt, Simon, Jonas Heide Smith, and Susana Pajares Tosca. *Understanding Video Games: The Essential Introduction*. New York: Routledge, 2008.

Hanson, Cristopher. “Comics.” In *The Culture, Technology, and the Art of Gaming*, edited by Mark J. P. Wolf, 127–128. Westport, CT: Greenwood Press, 2012.

Jenkins, Henry. “Game Design as Narrative Architecture.” In *First Person: New Media as Story, Performance, and Game*, edited by Noah Wardrip-Fruin and Pat Harrigan, 118–130. Cambridge, MA: MIT Press, 2004.

Kirkland, Ewan. “Resident Evil’s Typewriter: Survival Horror and Its Remediations.” *Games and Culture* 4, no. 3 (2008): 115–126.

Klevjer, Rune. “Cut-Scenes.” In *The Routledge Companion to Video Games*, edited by Mark J. P. Wolf and Bernard Perron, 301–309. New York: Routledge, 2014.

Perron, Bernard. “Genre Profile: Interactive Movies.” In *Video Game Explosion. A History from Pong to PlayStation and Beyond*, edited by Mark J. P. Wolf, 127–128. Westport, CT: Greenwood Press, 2007.

Picard, Martin. “Video Games and Their Relationship with Other Media.” In *Video Game Explosion. A History from Pong to PlayStation and Beyond*, edited by Mark J. P. Wolf, 293–300. Westport, CT: Greenwood Press, 2007.

Pinchbeck, Dan. *DOOM: SCARYDARKFAST*. Ann Arbor: University of Michigan Press, 2013.

Rouse, Richard, III. “Made in Hell: The Inevitable Success of the Horror Genre in Video Games.” In *Horror Video Games, Essays on the Fusion of Fear and Play*, edited by Bernard Perron, 15–25. Jefferson, NC: MacFarland & Company, Inc., 2009.

Wolf, Mark J. P. “Electromechanical Games.” In *Encyclopedia of Video Games: The Culture, Technology, and the Art of Gaming*, edited by Mark J. P. Wolf, 184–185. Westport, CT: Greenwood Press, 2012.

Wolf, Mark J. P. “Laserdisc Games.” In *Video Game Explosion. A History from Pong to PlayStation and Beyond*, edited by Mark J. P. Wolf, 99–102. Westport, CT: Greenwood Press, 2007.

Wolf, Mark J. P. *Myst and Riven: The World of the D’ni*. Ann Arbor: University of Michigan Press, 2011.

Replay and Repetition

Replay and repetition function as core gameplay elements in most video games, including helping the player to learn play mechanics of a given game and extending a game’s long-term play value by allowing for predictability and variability between multiple game sessions. Aspects of repetition in gameplay predate video games; nondigital games often place an emphasis on the player’s replaying of a game as a means of learning the rules of play. However, video games often emphasize aspects of repetition and replay even more than traditional games for a number of reasons beyond those of traditional games, including using high scores to encourage mastery of a game through its repeated play and rewarding players who replay a level or entire game after they have been successfully completed. More recently, some video games have begun incorporating aspects of repetition into their gameplay mechanics by allowing—and even requiring—the player to manipulate the passage of time within their structures, further emphasizing replay.

Traditional games such as basketball and chess often require players to play them a number of times to fully grasp the rules and play mechanics of the game. Each time a player replays a game, he or she may learn new rules or more effective play strategies that will help him or her to become a more effective player. Game theorists, including Jesper Juul, refer to games as *state machines* (a term taken from computer science) to help describe the changes in state that are essential to the play of games. For example, each time a player performs an action, such as moving a piece in chess, the game's state transforms because the other player's possible moves may change; for instance, the first player's move may block potential movement of the second player's pieces. Board games particularly emphasize replay because it is possible to replay the exact same events if the same moves are made each time; in chess, for instance, two players may reproduce a famous historical match by making the exact same moves as were made in the original game.

Almost all video games similarly emphasize their repeated replay to help the player learn their play mechanics. Early video games introduced entirely new modes of play by requiring players to manipulate an interface, such as a dial or joystick, to control a sequence of events on an electronic screen. Games such as Atari's *PONG* (1972) also featured few, if any, instructions to help the player understand their rules and effective play strategies. Video games often require skillful manipulation of game elements, such as moving the paddle in *PONG* to bounce a ball to score points and complete game levels.

A first-time player of a coin-operated game is likely learning many of that game's play mechanics through the process of playing, and thus the possibility of player frustration may be high because the player may be unaware of how the game operates and thus might make repeated mistakes. The designers of arcade games must balance this potential frustration with the need to generate revenue by encouraging players to continue to deposit coins in the machine; game companies adopted the industrial strategy of often giving the player a set amount of time or a few tries, or *lives*, in which to play the game. This allows players to make mistakes while learning the game but still continue to play, thus allowing the player several replays of a game in each game session. Video games such as Midway's *Ms. Pac-Man* (1981) reward players who achieve specific point scores with an additional life within the game, providing another opportunity to replay the game.

Replay is also emphasized in video games by requiring players to observe and learn patterns of movement to successfully complete levels within the game. Platform games (also known as *platformers*) such as Nintendo's *Donkey Kong* (1981) and *Super Mario Bros*. (1985) oblige the player to maneuver through increasingly complex levels, avoiding obstacles and jumping between platforms to successfully complete a level. Through these core gameplay mechanics, players must learn the patterns of movement of enemy characters and features of the game levels through processes of trial and error. These games thus emphasize the repeated replaying of game levels (and portions thereof) to gain a degree of familiarity over their associated patterns of movement for their successful completion. Because the enemies and patterns of movement in platform and other similar games are often preprogrammed, players may memorize or preprogram controller inputs on a computer to complete a game in as brief a time as possible and share videos of these *speedruns* with other players. This mastery based on repetition rewards players through replay much like a high score table, albeit offering players new modes to challenge other players in communities built around the repeated play of specific games.

Some home video games may encourage players to replay the entire game after its successful completion by offering players incentives, such as new costumes, equipment, or abilities for their avatar, that were not available on the first playthrough of the game. Silicon Knights' *Eternal Darkness: Sanity's Requiem* (2002) prompts the player to replay the game several times, rewarding the player in each iteration with more of the game's backstory before revealing the "true" ending of the game after several such playthroughs. Much like the economic strategy of arcade games offering players several lives, this encouragement to play through a game that a player has purchased increases its *replay value*, a term used by game reviewers, marketers, and consumers to assess a game's potential for continued play value after its completion. Games may also increase replay value by randomizing level layouts, objects, and enemy characters encountered each time the game is played, essentially creating new game situations or scenarios with every session of gameplay. For example, the game *Rogue* (1980) was first developed for computer mainframes by Ken Arnold, Michael Toy, and Glenn Wichmann and employs simple graphics based on the symbols found in character sets common to computer systems to represent the player, dungeon maps, and various creatures and objects. Each game session of *Rogue* randomly generates these map layouts and elements, creating a unique game experience each time. Named for the play mechanics inspired by this game, the genre of *rogue-like* games features randomization of game elements, such as procedurally generated levels and permanent death (or *permadeath*), wherein the death of a player-controlled character is irreversible.

More recent temporal navigation or temporal manipulation games such as Ubisoft's *The Prince of Persia: The Sands of Time* (2003), Number None's *Braid* (2008), Dontnod Entertainment's *Life Is Strange* (2015), Remedy Entertainment's *Quantum Break* (2016), Superhot Team's *Superhot* (2016), and Askiisoft's *Katana Zero* (2019) require the player to rewind, slow, or similarly manipulate time while playing and incorporate replay to correct mistakes and solve puzzles to successfully complete them. Such games use replay as a core mechanic of the games themselves, further emphasizing forms of repetition within video games.

Although replay and repetition have long functioned as key aspects of learning and mastering all forms of games, they play a central role in an increasing number of video games and the ways in which they are enjoyed, experienced, and shared by players.

Christopher Hanson

See also: Replay and Repetition

Further Reading

Hanson, Christopher. “An Instinct Towards Repetition: Replay Value, Mastery, and Re-Creation.” In *Game Time: Understanding Temporality in Video Games*, 110–134. Bloomington: Indiana University Press, 2018.

Juul, Jesper. “Introduction to Game Time.” In *First Person: New Media as Story, Performance and Game*, Noah Wardrip-Fruin and Pat Harrigan, 86–109. Cambridge, MA: MIT Press, 2004.

Kocurek, Carly A. “Coin-Drop Capitalism: Economic Lessons from the Video Game Arcade.” In *Before the Crash Early Video Game History*, edited by Mark J. P Wolf, 189–209. Detroit, MI: Wayne State University Press, 2012.

Nohr, Rolf. “Restart after Death: ‘Self-Optimizing,’ ‘Normalism,’ and ‘Re-Entry’ in Computer Games.” In *The Game Culture Reader*, edited by Jason C. Thompson and Marc A. Ouellette, 66–83. Newcastle upon Tyne, England: Cambridge Scholars Publishing, 2013.

Wolf, Mark J. P. “Time in the Video Game.” In *The Medium of the Video Game*, 77–91. Austin: University of Texas Press, 2001.

RePlay Magazine

RePlay magazine is a trade magazine that covers the out-of-home amusement and family entertainment industries. Eddie Adlum founded *RePlay* in 1975, after leaving his position at *CASHBOX Magazine*. (*CASHBOX* covered the music and coin machine industries in the United States from 1942 to 1996, relaunching as a web-only publication in 2006.) *RePlay* began publishing monthly in October 1975, and the magazine’s name was selected because it bore meaning for the jukebox industry and the amusement industry and because it is a pun on “regarding play.”

RePlay’s subscription base peaked at sixty-five hundred during the video game boom of the early 1980s. It declined with the coin-operated video game industry, and eventually settled at a subscription rate roughly half that during the boom. Most copies of *RePlay* are sent to subscribers in the United States, with just a tenth shipping internationally.

RePlay targets business owners who have a vested interest in industry news; the readership includes operators, arcade owners, and game manufacturers and distributors. Types of amusements covered by *RePlay* include coin-operated video games, pinball machines, crane machines, jukeboxes, pool tables, and others.

Historically, *RePlay* has covered numerous emerging trends of interest to its readers, including the automated teller machine (ATM), the addition of upscale attractions to family entertainment centers, and, of course, video arcade games. As a trade journal, the focus of *RePlay* is directly shaped by shifts in the industry and often responds to trends or perceived threats, ranging from legal regulation to moral concerns. Coverage in the magazine generally includes corporate profiles, interviews with game company executives, notices of relevant court cases, and challenges to the amusement industry as well as editorial responses to public issues. Regularly included sections of the magazine include a news section, “Hot

Off the Press!"; a chart of the most played games called "Players' Choice"; and classified ads for the sale of used machines labeled the "Buyers' Bulletin."

RePlay publishes several special editions a year, such as the ASI (Amusement Showcase International) issue, the AMOA (Amusement and Music Operators Association) Expo showbook issue, and an annual industry directory. Back issues of *RePlay* often include editorial responses to contemporary issues of concern to arcade owners and operators. City and state efforts at governing distribution of and access to video games have received significant coverage, as have official statements on the value of video games. *RePlay* has responded to legal battles faced by the industry and has also offered responses to negative publicity from major figures such as U.S. surgeon general C. Everett Koop and President Ronald Reagan.

Although *RePlay* has and continues to cover a wide range of amusements, during the late 1970s and early 1980s, it included extensive coverage of coin-operated video games. In the years directly preceding the industry crash of 1983, the bulk of the articles addressed the video game industry. Since the crash, *RePlay* has continued to offer significant coverage of coin-operated video games. The magazine is particularly useful for those interested in the marketing and distribution of coin-operated games. *RePlay*'s corporate profiles can also be helpful in identifying key players in the production of certain games, many of which have partial credits, if any credits are available. *RePlay* magazine is headquartered in Tarzana, California.

Carly A. Kocurek

See also: Arcade Games; Journalism; *Play Meter* Magazine

Further Reading

RePlay magazine website. Accessed October 2, 2020. Available at http://www.replaymag.com.

Representations of Video Games in Hollywood Cinema

As video games have become increasingly popular in American culture and the industry has established itself as a major contender for media audiences and the financial capital they wield, they have progressively influenced and appeared within the narratives of Hollywood films. Since the 1970s, filmmakers of both major blockbusters and smaller films targeted at niche audiences have incorporated the visual style of video games into their films, constructed narratives specifically representing video game and arcade culture, and utilized the concept of virtual worlds to inspire both utopian and dystopian science fiction fantasies. Hollywood filmmakers have also adapted individual games and game franchises into films and used the play of specific video games to situate their stories within a cultural milieu unique to the time period of film production.

While video games have appeared in Hollywood films since the early 1970s, with *Computer Space* (1971) being played by a character in *Soylent Green* (1973), multiple histories highlight Walt Disney Productions' *Tron* (1982) as the first major crossover between video games and high-concept Hollywood filmmaking. *Tron*'s narrative revolves around computer programmer and game designer Kevin Flynn (Jeff Bridges), who, due to corporate maneuvering and intrigue within the software manufacturer ENCOM, now manages a game arcade after witnessing the video games he designed being wrested from his control. As Flynn attempts to hack into the ENCOM security system, ENCOM's nefarious Master Control Program digitizes and transports him into the company's computer mainframe, where he must actively play his own games against his ENCOM adversaries from within the system itself. Not only does *Tron* position the protagonist as an enthusiastic video game programmer and a talented game player, but it also features computer-generated imagery that replicates the visual style of games from the time period—most notable in the Light Cycle race that opens the film—foregrounding bravura digital visuals that evoke the vector graphics common in many early video games. While the Light Cycle race specifically replicates racing games, other sequences, such as a battle in which Flynn must target and evade airships through a heads-up display during close-quarter combat, reference other game genres popular at the time, in this case vector-based shooting games such as *Battlezone* (1980). In *Tron*, Flynn's proficiency at actual video game play and knowledge of game design allow for his successful negotiation of a digital game system within which he is truly immersed, resulting in the narrative's triumphant conclusion.

Importantly, the game company Bally/Midway adapted *Tron* into a successful arcade game in 1982, recasting the film's game sequences, such as the Light Cycle race, into a series of increasingly difficult levels. This arcade game appears in Disney's sequel to the original film, *Tron: Legacy*, released in 2010; Sam Flynn (Garrett Hedlund), Kevin Flynn's son, enters the virtual world his father created through the latter's dilapidated video game arcade after finding his laboratory hidden behind *Tron*'s arcade cabinet. Visualizing decades of change in video game graphics and genres since the initial film's premiere, set to a throbbing electronic soundtrack by Daft Punk, and released theatrically in IMAX 3D and Dolby Digital 3D, *Tron: Legacy* depicts Sam Flynn's fight to free his father, again played by Bridges, from his virtual doppelgänger, Clu (also Bridges). Through highly choreographed martial arts showdowns, projectile-focused arena battles, and spectacularly explosive Light Cycle races, the obvious advancements in computer-generated imagery and the dynamic use of 3-D in the film are a stark departure from the vector graphics of the original film—and game—while also being an homage.

Although *Tron* is certainly an inarguable touchstone in the history of Hollywood's representation of video games, the incorporation of the computer graphics common to arcade games in major Hollywood films, and the virtual worlds they signify, predates *Tron*'s 1982 release. In George Lucas's groundbreaking *Star Wars*, released by Twentieth Century Fox in 1977, both the Rebel forces' three-dimensional map of the Death Star and the piloting system Luke Skywalker (Mark Hamill) and other X-wing pilots use to aid their attack on the imperial fortress evoke the wireframe graphics of vector games that were introduced that same year. The targeting system specifically implies the visual construction and functionality of arcade shooting games, and the appearance of the on-screen display, coupled with the joysticks and push-buttons the X-wing pilots use to maneuver their small spacecraft as they near the Death Star's single weak spot, brings to mind the interfaces of early arcade cabinets and the design of early arcade games. Similarly, the opening credit sequence of Disney's *The Black Hole* (1979) is composed on a three-dimensional vector display grid that maps the descent into the titular spatial anomaly that is the focus of the film's entire narrative. Although not overtly referencing specific video games themselves, these spectacular, digitally constructed sequences from 1970s Hollywood films emphasize the visual style of many arcade and home console–based games of the time, uniting a fidelity to the period's game graphics with narratives revolving around interstellar warfare, itself the narrative basis of such games as *Spacewar!* (1962), *Space Invaders* (1978), and *Galaxian* (1979).

Much as *Tron* situated a video game designer as the hero in a war against both malicious software and corporate intrigue, Hollywood films of the early 1980s positioned youthful video game players as protagonists fighting powerful enemies. Teenager David Lightman (Matthew Broderick), the central character of John Badham's popular film *WarGames* (1983), is both a computer hobbyist and a game enthusiast; when not hacking into his high school's server with his IMSAI microcomputer and modem to alter his own grades or those of Ally Sheedy's Jennifer, Lightman plays the digital games he encounters on early local area networks (LANs) and servers. Accidentally engaging a U.S. Air Force supercomputer, known by both the acronym WOPR (War Operation Plan Response) and the code name Joshua, in a game of "global thermonuclear war," Lightman must break into an air force base to prevent the beginning of World War III. Unable to hack into the supercomputer and gain control directly, Lightman instead engages the computer in a digital game of tic-tac-toe, thus teaching the computer the concept of a stalemate from which neither side can win. Averting a nuclear holocaust through a children's game, *WarGames* contrasts the video games increasingly present in early 1980s suburbia with the Cold War, a potentially devastating game of political posturing and military strategy. The film professes a fear that intelligent machines and their programmers, in control of the United States' nuclear stockpiles, are ignorant of the real-world consequences of their actions, although it nonetheless positions a video game player's ingenuity as the solution to global annihilation.

During the 1980s, Hollywood's willingness to represent video games, and specifically arcade culture, became increasingly prominent. *The Bishop of Battle* (the third in a series of four short films released theatrically as the horror anthology *Nightmares* in 1983) and *The Last Starfighter* (1984), although eventually conforming to the respective genres of horror and science fiction that structure their narratives, feature protagonists who obsessively play arcade games. *Battle*'s J. J. Cooney (Emilio Estevez) hustles arcade attendees in downtown Los Angeles by downplaying his own gaming skills, and *Starfighter*'s Alex Rogan (Lance Guest) escapes the travails of family and trailer park life by playing the only arcade game that stands outside the trailer park's office, aptly titled *Starfighter*. Both teenage boys with exceptional gaming skill, Cooney and Rogan are also similar in that issues of familial domesticity trouble their lives, as Cooney's beleaguered parents worry about his declining grades and Rogan must continually negotiate his role as the oldest child in a single-parent household.

Both *Battle* and *Starfighter* represent video game players similarly, but their narratives bespeak opposing views on video games' effects on youth culture. In *Starfighter*'s science fiction narrative, Rogan becomes a celebrated intergalactic hero because of his gaming proficiency, whereas *Battle*'s horrific cautionary tale leaves Cooney trapped within the very video game he champions.

The debate over the potentially deleterious effects of video game play on youth culture is indeed the narrative foundation of the 1980s teen sex comedy *Joysticks* (1983), in which a video game arcade becomes the focus of a political battle waged between the arcade's teenage owner, Jefferson Bailey (Scott McGinnis), and upstanding parent-activist Joseph Rutter (Joe Don Baker). Aside from the less-than-subtle sexual innuendo that infuses the film, from the title itself to the conflation of video game "scoring" with sexual proficiency, *Joysticks* creatively depicts the generational divide palpable to youthful video game enthusiasts during the 1980s, particularly in a humorous subjective sequence that contrasts both Bailey's and Rutter's fantasies about the unmasked video game arcade. Whereas Bailey fantasizes about a venue of youthful freedom, sexual liberation, and self-expression, Rutter fears a hellish, shadowy den of moral vice. Even the editing of *Joysticks* is overtly inspired by video games, as the transitional wipes that separate the film's individual scenes are of an intrusive yellow orb, clearly resembling Pac-Man, eating its way through the mise-en-scène.

Video games both inspired Hollywood's science fiction fantasies and influenced the teen sex comedy and cautionary horror genre during the late 1970s and early 1980s, but they also appeared in films to situate the viewer within a film's narrative world. Watching a character play a particular video game could speak volumes about his or her interests, socioeconomic status, and favorite hobbies. Rob Reiner's self-aware swashbuckling fantasy *The Princess Bride* (1987) opens with a screenshot from Accolade's *Hardball* (1985) for the Commodore 64, which is played by Fred Savage during the film's opening sequence. The on-screen virtual world contrasts strongly with the literary world Savage's character discovers in the pages of a book ("When I was your age, television was called books," says the character's grandfather, played by Peter Falk), and the opening shot of the video game works to define Savage's character as hip, computer savvy, and upper middle class, as he has both a game system and television in his spacious bedroom.

Other examples of video games situating film characters include the montage sequences that establish a romantic relationship between Daniel Larusso (Ralph Macchio) and Ali Mills (Elisabeth Shue) in *The Karate Kid* (1984), all of which take place at the local high school hangout, an overcrowded arcade; the continual play of games such as *Double Dragon* (1987), *Rad Racer* (1987), *Ninja Gaiden* (1988), and *Super Mario Bros. 3* (1990) in *The Wizard* (1989), a film that functions as much as an advertisement for Nintendo games and peripherals as it does as a coming-of-age adventure; and scenes of skilled children proficiently playing arcade games in *Toys* (1992) while the villainous General Leland Zevo (Michael Gambon) is unable to distinguish between the reality of warfare and the designed fantasy of wargames, establishing Zevo as an obsessive and ignorant character.

Although Nicholaus Goossen's film *Grandma's Boy* (2006) would return to video game culture as a theme—its narrative focusing on the shenanigans of a group of game testers and programmers grappling with middle age and their own juvenility—the 1990s and 2000s experienced a far more literal translation of video games into Hollywood cinema. Beginning in 1993 with Annabel Jankel and Rocky Morton's *Super Mario Bros.* and continuing with *Double Dragon* (1994), *Street Fighter* (1994), *Mortal Kombat* (1995), *Lara Croft: Tomb Raider* (2001), *Resident Evil* (2002), *DOOM* (2005), *Silent Hill* (2006), *Max Payne* (2008), *Prince of Persia: The Sands of Time* (2010), *Need for Speed* (2014), and the animated *The Angry Birds Movie* (2016), among numerous others, extremely successful video games have been directly adapted for movie theater screens. Frequently panned by critics but nonetheless achieving popularity with audiences, the direct adaptation of popular video games into Hollywood films predominantly takes the game's narrative world as a basis for melodrama nonexistent in the games themselves while translating the game's core mechanics into scenes of visual spectacle. Some examples include the first-person perspective that popularized the first-person shooter (FPS) genre in the game *DOOM* (1993), the mapping and exploration of an underground laboratory in *Resident Evil* (1996), and the use of player-activated slow-motion during gunfights in *Max Payne* (2001), which became the focus of special effects sequences within the games' film adaptations, specifically hailing audience members who have actually played the games while being of little relevance to the film's stories. Many of these films, like the video games they are based on, inspired sequels of their own; although *Mortal Kombat: Annihilation* (1997), *Silent Hill: Revelation* (2012), and *Angry Birds 2* (2019) are (as of 2019) the only sequels to their respective original films released theatrically, the enormously successful *Resident Evil* franchise has spawned five sequels and is currently being remade.

Recently, studios adapting films based on video games have sought larger audiences and greater critical acclaim by casting Hollywood superstars and Oscar-winning actors in their movies; examples include *Warcraft* (2016), helmed by celebrated director Duncan Jones; *Assassin's Creed* (2016), starring Michael Fassbender, Marion Cotillard, Charlotte Rampling, Jeremy Irons, and Brendan Gleeson; the *Tomb Raider* remake (2018), starring Alicia Vikander; and *Rampage* (2018), starring Dwayne Johnson.

During the 1990s and 2000s, the science fiction and horror cautionary tale of both video game addiction (evident in *The Bishop of Battle*) and a societal overdependence on computer technology also witnessed frequent reiteration. *The Lawnmower Man* (1992) features a scientist who, while experimenting with virtual reality (VR) software, creates a super-intelligent, malicious digital monster out of an autistic groundskeeper, and *Brainscan* (1994) depicts a teenage voyeur and horror enthusiast enacting murderous fantasies due to a survival horror game that hypnotizes and brainwashes him. Horror films such as *Gamebox 1.0* (2004) and *Stay Alive* (2006), in which players respectively become trapped inside game worlds or die when the game world and the real world begin to merge, continued this cautionary trend into the 2000s. Higher budget, critically successful films also critiqued the potential entrapment of characters inside expansive virtual worlds, with 1999 alone seeing the release of David Cronenberg's *eXistenZ*, Josef Rusnak's *The Thirteenth Floor*, and the Wachowskis' blockbuster hit *The Matrix*. A decade later, Jonathan Mostow's *Surrogates* (2009) and Mark Neveldine and Brian Taylor's *Gamer* (2009) returned to the subject of entrapment in virtual worlds.

In the 2000s, the visual style of video games also influenced particular sequences in major Hollywood films, with specific scenes in *Crank* (2006), *Fantastic Mr. Fox* (2009), and *Avatar* (2009), replicating 8-bit arcade games, platform jumpers, and FPFs, respectively, through their mise-en-scène. Edgar Wright's *Scott Pilgrim v. the World* (2010) incorporated video game visuals, soundtracks, and references to specific games, such as *The Legend of Zelda* (1986) and *Tony Hawk's Pro Skater* (1999), into a movie that uniquely hybridizes elements of film form, graphic novel artwork, and video game design while depicting a generation well versed in all three media.

Academic research on Hollywood cinema's representation and incorporation of video games focuses on multiple issues present in the filmic adaptation of games and game narratives. Such issues include how films depict game hardware and software interacting with the human body (Keane 2002); how spectacle functions differently in games and film (King 2002); how the relationship between narration and emotional evocation differs depending on the medium (Weise and Jenkins 2009); contrasts between subjective and first-person perspectives in film and games (Galloway 2006); interrelationships between the computer and entertainment industries (Ruggill 2009); and how the different media inform one another in the age of technological convergence—specifically, how convergence relates to the narrative construction of franchises and world-building designed to inform both game and film properties (Jenkins 2006).

Harrison Gish

See also: Film; Silent Film; Video Game Movies

Further Reading

Galloway, Alexander R. "Origins of the First-Person Shooter." In *Gaming: Essays on Algorithmic Culture*, 39–69. Minneapolis: University of Minnesota Press, 2006.

Jenkins, Henry. "Searching for the Origami Unicorn: *The Matrix* and Transmedia Storytelling." In *Convergence Culture: Where Old and New Media Collide*, 93–130. New York: New York University Press, 2006.

Keane, Steve. "From Hardware to Fleshware: Plugging into David Cronenberg's *eXistenZ*." In *ScreenPlay: Cinema/Videogames/Interfaces*, edited by Geoff King and Tanya Krzywinska, 145–156. London: Wallflower, 2002.

King, Geoff, and Tanya Krzywinska, eds. *ScreenPlay: Cinema/Videogames/Interfaces*. New York: Wallflower Press, 2002.

Ruggill, Judd Ethan. "Convergence: Always Already, Already." *Cinema Journal* 48, no. 3 (2009): 105–110.

Weise, Matthew, and Henry Jenkins. "Short Controlled Bursts: Affect and Aliens." *Cinema Journal* 48, no. 3 (2009): 111–116.

Resident Evil Series

Labels to describe genres are usually created after the fact by theorists or critics to refer to a group of artworks with common features that generate comparable expectations. It is rather rare that one work (or a production team) coins the appellation for a genre it is about to breed. Yet, that is what happened with *Resident Evil* (1996). To generically tag it, as was the tradition in Japan, Capcom used the English expression "survival horror" on the cover of the trial version and the commercial one in 1996. What is more, when the game was restarted from a saved file, a message was typed in three parts during the loading screen: "You have once again entered / the world of survival horror. / Good luck!" As the label was not indicated on the covers in the Western Hemisphere, it is through this loading screen that gamers learned about this "world" and began to talk about it.

Resident Evil belongs to the horror genre. In terms of gameplay, it is a mix of action and adventure. Designer Shinji Mikami wanted to make a game in first-person perspective, but he changed his mind when he played the innovative third-person perspective *Alone in the Dark* (1992) crafted by the French Frédérick Raynal and decided to adapt the model. The similarities between the two games are therefore numerous. Focusing on *Resident Evil*, the gamer can either play Jill Valentine or Chris Redfield, two members of the Special Tactics and Rescue Service (S.T.A.R.S.), and their scenarios are slightly different. The 3-D polygonal characters are trapped in the Spencer Mansion, which is pre-rendered in 2-D. Various items have to be found and puzzles solved to open doors and to progress to new locations and the way out.

To give a cinematic touch, the game world is shown through predetermined camera angles that exploit, in turn, the off-screen space. Tank controls constrain the movements of the player character and render the encounters with the monsters more stressful. Also, resources, such as ammunition and herbs to heal, are scarce and need to be carefully managed. Even though *Resident Evil* was not groundbreaking upon its release, it had exemplarily perfected the novel effects introduced in *Alone in the Dark*. Nor was it the first zombie game; but even if the living dead were not swarming, they could come about behind every door or around every corner. As reviewers of the time asserted, *Resident Evil* could be compared to a horror film. Capcom wanted to make an adult-orientated game, and it was indeed a genuinely scary gaming experience punctuated with effective startle effects.

Upon its entrance to the Spencer Mansion, built in the forest near Raccoon City, an industrialized American city located in the Midwest, the Alpha Team starts to discover the top secret activities of the Umbrella Corporation, a large international pharmaceutical organization inconspicuously developing virus and Bio-Organic Weapons (B.O.W.). This will only be the tip of the iceberg.

The fight between Good and (Resident) Evil evolved into a best-selling transmedia franchise of more than twenty games (excluding the remastered versions and the remakes), ten films (both computer animated and live action—a series of six chapters), and comics and manga as well as novelizations. The action takes place in the United States, Europe, and Africa (in *Resident Evil 5* [2009], a white member of security forces coming to an African region to kill Black enemies did stir controversy). It features a cast of recurring characters, both female and male: Jill, Chris Redfield, his sister Claire, Rebecca Chambers, Leon Kennedy, Ada Wong, Barry Burton, and Albert Wesker, a S.T.A.R.S. member working undercover for Umbrella. Although there are obviously villains pulling the strings in the shadows, *Resident Evil* is best known for its fiends. An engineered virus turns workers and other creatures into zombies (which are more and more numerous as the series progresses) and B.O.W., such as the Hunter (a mix of gorilla and lizard), the Licker (a combination of feline and reptile), the Bandersnatch, the Tyrant, and the Nemesis (all deformed humanoids). Some scientists, such as Alexia Ashford and William Birkin, inject themselves with their infectious organisms and transform into worse monstrosities.

PS4
PLAYSTATION VR
COMPATIBLE ZGODNOSC
RESIDENT EVIL
biohazard
18
CAPCOM

Packaging for *Resident Evil 7*. (Petrajz/Dreamstime.com)

To forge the survival horror genre, the formula of the first *Resident Evil* was cloned, iteratively improved, and changed, starting with Capcom itself. *Resident Evil: Code: Veronica* (2000) integrates real-time 3-D environments; the various locations are still seen through predetermined camera angles, but the virtual camera now tracks Claire in the shots, adding an immediate dynamism to the movements. *Resident Evil 4* replaces the fixed camera with one following Leon over the shoulder. When they are hurt, player characters walk with an unsteady gait in *Resident Evil 2* (1998). During parallel event lines, a “zapping” system shows actions taken by one character in one scenario affect the scenario of the other. As gamers are able to switch partners on the fly in *Resident Evil Zero* (2002), an online multiplayer option was offered in *Resident Evil: Outbreak* (2003), and an off-line co-op mode allows them to play together in *Resident Evil 5*. Up until this fifth installment, to enhance their vulnerability, S.T.A.R.S. members could not run and shoot at the same time. But various evasive and attack moves have been added over time, including new and more accurate weapons (with *Resident Evil 4*’s laser sight handgun standing out most prominently). Through its evolution, the video game series has become more action oriented, leaving out the frightening dimension that was the basis of the initial design.

Yet, and this is one of its strengths, the series is not afraid to experiment and to somehow renew itself. Indeed, notwithstanding that *Resident Evil: Survivor* (2000) used a first-person perspective, *Resident Evil VII: Biohazard* (2017) has been the first full triple-A scary game sold for the PlayStation VR and a notorious return to its roots. That being said, the popular and critical acclaim of the remake of *Resident Evil 2* (2019) also proves that repetition continues to be as important as variation. As a genre that *Resident Evil* has crystallized, survival horror will likely remain in good hands with Capcom's series.

Bernard Perron

See also: Survival Horror Games

Further Reading

Capcom. *Resident Evil Archives*. Vol. 1. (1960–1998) and vol. 2 (2002–2009). Indianapolis, IN: Brady Publishing, 2006 and 2011.

Perron, Bernard, ed. *Horror Video Games: Essays on the Fusion of Fear and Play*. Jefferson, NC: McFarland, 2009.

Perron, Bernard. *The World of Scary Video Games. A Study in Videoludic Horror*. New York: Bloomsbury, 2018.

Resolution

The concept of *resolution* is used in computer graphics and is therefore applicable to video game imagery. Resolution refers to the number of discrete units (such as pixels, frames, available colors, or polygons) used to represent (or resolve) a portion of an analog spectrum, in particular, those of space, time, color, or geometry. Because of memory limitations, processing speed, and monitor capabilities, these four types of resolution are always limited in some way, requiring graphic designers and game designers to take them into consideration, to some degree, especially in projects encountering more restrictive limitations regarding resolution.

Spatial resolution is measured in pixels per inch and refers to the amount of detail possible in a digital image. The more spatial resolution that is available in an image, the smaller the detail that can be represented in it (although processing power and software-related restrictions can also limit resolution, as in early home video games, like those of the Atari VCS 2600). The lower an image's spatial resolution, the more apparent the edges of individual pixels will be, resulting in a jagged appearance referred to as *aliasing*. The effects of aliasing can be lessened by using rows of pixels of interpolated colors or tones at boundaries between different colors or tones, to make the transition between them more gradual; this process is called *anti-aliasing*.

Temporal resolution refers to the number of frames per second used in time-based media. The more frames per second used in moving imagery, the smoother the apparent motion can appear within the imagery. Temporal aliasing, known as *strobing*, occurs because a frame rate is too low to convey a sense of smooth motion, and moving objects appear to jump from one position to another rather than moving smoothly between them. The effects of strobing can be lessened through the use of *motion blurring*, which simulates the blur that an object would have passing through a given span of space in a given span of time, all within a single image. The addition of motion blur to a moving object fills in the gaps between the object's positions from one frame to the next, smoothing the overall appearance of the motion.

Color resolution (or in the case of grayscale imagery, *tonal resolution*) is measured in bits per pixel and refers to the number of colors available for use in an image or series of images (for n bits there are 2^n possibilities). When the color resolution of an image is low, the jump from one color to another along a gradient is more abrupt and noticeable, resulting in color aliasing or *mach banding*, also known as *posterization*. This can be alleviated through the use of *dithering*, in which pixels of different colors are mixed in changing ratios across the boundary between colored areas, allowing one color to increase while another decreases, simulating a gradient between different colors or tones when the image is viewed from a distance or if the spatial resolution is high enough.

Geometric resolution, when applied to three-dimensional graphics, refers to the number of polygons used to resolve a three-dimensional shape within a three-dimensional space. Low geometric resolution, in which the individual polygons are discernible, results in a blocky or faceted appearance, whereas higher resolution allows for smoother curves and flowing forms. Naturally, simpler objects require fewer polygons, and increasingly complex ones require more. One of the challenges of computer modeling is to represent the object being modeled with as few polygons as possible while still maintaining as realistic an appearance as possible. Low-resolution models can be aided by certain shading techniques, such as Gouraud shading or Phong shading, which apply color or tonal gradients across polygons so that their boundary colors match, making the boundaries between them less noticeable and smoothing their appearance. Other computer graphics processes, such as NURBS, nonuniform rational basis (or Bézier) splines, allow geometric resolution to change dynamically based on the apparent distance from the viewer, to save calculation and rendering time when objects take up less on-screen space (Polevoi 2000).

Different types of resolution can affect and compensate for each other's limitations. For example, the aliasing in an image with low spatial resolution can be eased with higher color resolution that allows anti-aliasing to be done. Higher color resolution also makes motion-blurred imagery possible because blurs require gradients, and smoother gradients, used by shading techniques, can reduce the effects of limited geometric resolution. Higher spatial resolution can make up for low color resolution by making dithering less noticeable and color gradients appear smoother. The quality of grayscale imagery is also perceived differently from color imagery, with a wider dynamic range of color making up for lower spatial resolution, so a designer wishing to save memory should reduce the tonal resolution in grayscale imagery while leaving the spatial resolution unchanged; in contrast, for color imagery, the spatial resolution of color images should be reduced while the color resolution is left unchanged (Ester 1990).

Even as screen resolutions, memory, and processing speeds increase, the need for economy and continual pushing of boundaries ensures that issues related to resolution will need to be taken into consideration for some time to come.

Mark J. P. Wolf

See also: Graphics; Z-Axis Depth

Further Reading

Ester, Michael. "Image Quality and Viewer Perception." *Leonardo,* Supplemental Issue (1990): 51–63.

Foley, James, Andries Van Dam, Steven K. Feiner, and John F. Hughes. *Computer Graphics: Principles and Practice*. 2nd ed. Upper Saddle River, NJ: Addison-Wesley Professional, 1995.

Polevoi, Robert. "Lesson 83-3D E-Commerce with MetaStream-Part 3." From *3-D Animation Workshop*, January 5, 2000. Available at https://web.archive.org/web/20050324155257/ttp://www.webreference.com/3d/lesson83/part3.html.

Resource Management Games

Managing resources is central to many games. In survival games such as *Rust* (2013) or *This War of Mine* (2014), players must scrounge for medicine, food, building materials, and weapons, while triple-A open-world first-person shooters (FPSs) such as *Fallout 4* (2015) include elements of resource management in the form of inventories and trading systems. In strategy games, such as Paradox Interactive's *Crusader Kings II* (2012) and *Europa Universalis IV* (2013), managing and accruing a variety of "resources," such as political, popularity, cultural, and research points, is the central goal in the game. Resource management can exist as the backbone of gameplay or as an addition to increase immersion and "realism" in the game world.

A resource management game can be understood very literally. For example, farming simulator games demand players plan, cultivate, and harvest their land for agricultural goods, managing agrarian capital and balancing their budget. Various tycoon games, such as *The Rise of Industry* (2018), act as market simulators, where one controls and tries to steer his or her corporation or business to immense wealth and power. Accumulating and increasing your ability to further accumulate certain resources is the core gameplay in these games, which often act more as capitalist simulators with very little narrative or characterization.

In games such as *Banished* (2014), the *Age of Empires* series, the *Tropico* series, and the previously mentioned Paradox Interactive games, players must gather, produce, or otherwise accumulate food, trading goods, money, political power, and natural resources. These games, as opposed to the farming simulator games, use resource management to further expand a city or nation. Often, one must consider military power and global trade when gathering resources, and researching technology or national ideas can enter into the equation. Resources also assume a more abstract quality; certain talented advisers or courtiers in *Crusader Kings II*, for example, provide you more political power, which is measured by numerical points. You can spend these points on various actions, such as quelling rebellions or increasing your popularity among a county's nobles. Resources need not merely be goods and services but can act more as conceptual in-game capital to be exploited.

Resource management in games can take the idea of a conceptual resource and interpret it in creative and unique ways. Failbetter Games' *Sunless Seas* (2015) puts the player in Fallen London, a steampunk Lovecraftian world below the earth's surface, where you play as a ship captain exploring the Unterzee—a subterranean ocean. Taking a particularly unique approach to resource management, players must balance and manage traditional resources, such as fuel and supplies; however, they must also control the sanity level of their crew, as the terror of exploring the dark sea can push your sailors to the brink. As an explorer, knowledge that others do not have is also an important form of currency—stories of distant shores and horrific vistas can earn you money, fuel, weapons, and crew members.

Two distinctions emerge from the preceding paragraphs. The first regards the role resource management plays in the overall game. Managing resources is a feature in many games, and a resource management game is one where this feature is the crux of gameplay. The second distinction resides in the nature of these resources. Certain games involve the managing of traditional resources, while others translate *resource* for more abstract or conceptual currencies.

Wolfgang Boehm

See also: Paradox Interactive; Simulation Games

Further Reading

Hivemind. "The 20 Best Management Games on PC." Rock, Paper, Shotgun, January 27, 2020. Available at https://www.rockpapershotgun.com/2020/01/27/best-management-games-pc/.

"Top 15 Resource Management Games for Android and iOS." Easy Tech Trick, April 29, 2019. Available at https://www.easytechtrick.org/resource-management-games/.

Resurrection. *See* Death and Resurrection

Retrogaming

Retrogaming is a hobby of playing older console-based games, computer games, and arcade games. Although there are no universally accepted criteria for inclusion in the *retro* category, the label is typically used in reference to discontinued platforms and software developed for such. According to this convention, a game such as *The Legend of Zelda: Ocarina of Time* for the Nintendo

64 is considered retro (because the system is no longer manufactured or supported), but Windows-bound *Half-Life* is not, regardless of the fact that both titles were released in 1998. By the same token, the category also encompasses new games—including original works as well as remakes and demakes (a demake is an interpretation of how a game *might* have looked if it had been made with older or newer technology)—created by homebrew communities organized around consoles such as the Atari VCS 2600 or the GCE/Milton Bradley Vectrex. In a broader sense, the term can also be applied to so-called retro throwbacks—releases that bring play mechanics and aesthetics reminiscent of earlier eras of game design to modern platforms (e.g., the 2-D platformer *Cave Story* [2004] or the twin-stick shooter *Geometry Wars: Retro Evolved* [2005]).

The emergence of retrogaming subculture has been attributed to a variety of factors, from general interest in the history of the medium, to nostalgic desire to relive personally meaningful gaming experiences, to growing dissatisfaction with the perceived creative crisis of the modern game industry (especially overreliance on licenses and sequels as risk-avoidance strategy in the face of rising development costs). Although personal motivations vary widely, the movement provides a much-needed counterpoint to the forward-looking mindset and rapid pace of change characterizing gaming culture. Perhaps most crucially, it keeps the medium's past alive, testifying to the continued relevance of technologies, design principles, styles—even entire genres—that, over the years, have undergone dramatic changes or been altogether cast aside. Moreover, because the hobby is typically associated with hardware and software collecting, retrogaming plays an important curatorial function, preserving and protecting aspects of game culture increasingly threatened by obsolescence (as a result of lack of support for discontinued hardware, software, and storage formats), "bit rot" (irreversible degradation of optical and magnetic media as well as decay of data contained in EPROM chips), malfunctions, and physical destruction (both accidental and, as has been the case with a number of arcade games, intentional; *see* "Suicide Battery"). A similar role is played by a number of community-driven emulation, documentation, and preservation initiatives—most notably the Multiple Arcade Machine Emulator (MAME) and its derivative, the Multi Emulator Super System (MESS). This is especially noteworthy given that organized, institutional efforts of this kind are still relatively rare.

Retrogaming's gradual movement from the fringes toward the mainstream has been, unsurprisingly, accompanied by growing commercial interest. The industry has been quick to capitalize on the "retro revival" with remakes and rereleases of older titles for modern systems. Because their small size makes such offerings well suited for digital distribution, in recent years, they have become virtual staples of platforms such as the PlayStation Network, Xbox Live Arcade, and Wii Virtual Console. In addition, some of the more popular vintage titles from such publishers as Namco, SEGA, and Atari have found their way into a number of low-cost, dedicated consoles. The trend contributes significantly to increasing the visibility and accessibility of retrogaming, but, with the likelihood of rerelease directly proportional to a given game's commercial viability, it also prompts questions about potential distortion of the history of the medium. Furthermore, the use of software or hardware emulation in "retro" products raises concerns regarding the authenticity of the resulting play experience (as games are taken out of their original social and technological context) or even its basic accuracy (due to emulation errors, altered controls, etc.).

P. Konrad Budziszewski

See also: Arcades; Video Games as Collectibles

Further Reading

Camper, Brett. "Retro Reflexivity: *La Mulana*, an 8-bit Period Piece." In *The Video Game Theory Reader 2*, edited by Bernard Perron and Mark J. P. Wolf, 169–195. New York: Routledge, 2008.

Retro Gamer magazine (2004–present). Available at https://www.retrogamer.net/.

Whalen, Zach, and Laurie N. Taylor, eds. *Playing the Past: History and Nostalgia in Video Games*. Nashville, TN: Vanderbilt University Press, 2008.

Rhetoric

Rhetoric is a field of study that focuses on communication, persuasion, interpretation and truth-finding, and symbolic language and semiotics. While this list is not exhaustive, the general supposition of rhetoric as communicative action underlies many definitions. The field of rhetoric is both an analytical profession (seeing what opportunities exist in certain situations) and an active profession (being a rhetor). The goal of rhetorical analysis is to understand the means of transformation in changing a person's thoughts, worldview, material realities, or relationships.

Rhetorical criticism within the field of rhetoric specifically refers to applying rhetorical frameworks or methods (often yet not exclusively qualitative) to uncover meaning, relationships between creators, audiences, material artifacts, and messages within a specific context (see deWinter 2006 for a synthesis on rhetorical criticism; see Paul 2010 for more on rhetorical methods in game studies). As Eyman (2016) writes in his introduction to *Play/Write: Digital Rhetoric, Writing, Games*, "Digital rhetoric sees agency in the interactions and interrelationships of any of the components of a given ecosystem. This is particularly important for digital game spaces, which feature both users and system agents (including non-player characters, the environments in which the actions take place, and the rules that govern in-game interactions)" (7).

Rhetoric as a method of study, then, lends itself well to game studies: it enables scholars to look to the game as text to see what visual, narrative, procedural, or ideological messages are embedded, offering excellent close readings on representation, purpose-driven narrative analysis, or capitalist critiques. It highlights the discourses around games, from the moral concerns and panics of games and violence (often through fantasy-theme analysis) to the instrumentalist views of games as master persuaders and life changers, such as the gamification work forwarded by McGonigal and Bogost (see Procedural Rhetoric). It uses material dialectic analysis frameworks to understand hardware, software, spatial setup, group formation, and individual transformation. It creates frameworks to make sense of emergent forms of communication, and work here has often focused on massively multiplayer online role-playing games (MMORPGs), online communities, and, increasingly, human–artificial intelligence (AI) communication.

In his book *Game Work: Language, Power, and Computer Game Culture* (2004), rhetorician Ken S. McAllister articulates a rhetorical method specific for understanding what he calls “the computer game complex” and “game work”: “The creation and playing of games entail different kinds of work, of course,” he writes, “but they all manufacture values ranging from the economic to the moral. And like any piece of artwork, a ‘game work’ is itself a medium through which these values are articulated and reproduced” (26). The rhetorical method that he posits responds to Kellner’s multiperspectival call to action and is grounded in the dialectical tradition and Brummet’s work on rhetoric in popular culture. Borrowing from Burke’s rhetorical “grammar,” McAllister offers this grammar of game work for a rhetorical analysis method based firmly in his analysis of the computer game complex:

1. Agents: “Every computer game begins with an agent: someone—or some collective—is always behind the management of meaning” (45).
2. Functions: “[The computer game complex] would have little influence on anything if [it] did not embody and enact particular approaches to managing meaning. Agents depend on (both consciously and unconsciously) the various ways that rhetoric works in different circumstances to effect change” (47).
3. Influences: “The five major influences on the computer game complex are the same as those that the complex itself imposes on culture: mass culture forces, mass media forces, psychosociological forces, economic forces, and instructional forces” (50).
4. Manifestation: “The computer game scholar . . . can understand the representational rules as a *manifestation* of the developers’ rhetoric, each rule corresponding to a meaning-making or meaning-managing event” (56). Additionally, “through their rhetoric, computer games require players to practice being the subjects that the developers have invented” (58).
5. Transformative Locals: “The shaping of meaning is necessarily dependent on the locale in which meaning making events are invoked. . . . The three categories of ideology that I described earlier—idiosyncratic (i.e., personal), homologous (i.e., communal), and inclusive (i.e., societal)—are the locals within which transformative experiences take place” (59).

Following this, McAllister offers a series of chapters using this rhetorical grammar, articulated together, to understand complex relationships in and around games, from individuals, creators, players, and communities to businesses, marketing, and economic forces. The strength of this analysis is McAllister’s understanding that not all rhetoric is purposeful; rather, rhetoric works at the level of ideology, of mimetic representation oftentimes without intentionality (as opposed to Aristotelian rhetorical traditions). Yet, this rhetoric, often visible at the intersection of these different grammars, shapes and transforms human activity and relationships and, in many ways, gives rise to many of the anxieties surrounding games in culture.

It is not an accident that many game scholars rely on Aristotelian rhetoric as a theoretical foundation: Aristotle's writing are "rediscovered" with the Renaissance and the rise of modernity. Aristotle's purpose was to observe and name the component parts of rhetoric to teach the ruling classes and, in naming those parts, controlling rhetoric and the people affected. In this way, rhetoric seems to embrace games (rule systems of manipulation and control) and deny play. Yet, here too, rhetoric has embraced play, understanding the transformative power of play. In an older piece, Beamlin (1987) notes that play fosters identification—one of the strongest of the rhetorical appeals—and thus play is a strong transformative force. Derrida and Bhabha have also noted play's rhetorical power in disrupting or subverting power structures. And Wark's *Gamer Theory* (2007) notes moments of empowerment within the game world through subversive play, such as trolling and trifling. Rhetoric in game studies, then, is not just about persuasion or manipulation; it is about agency, power, and transformation, and rhetorical applications of analysis must account for play as much as it accounts for rules, narratives, visual representations, or even designer and player activities.

Jennifer deWinter

See also: Procedural Rhetoric

Further Reading

Beamlin, James S. "Persuasion, Rogerian Rhetoric, and Imaginative Play." *Rhetoric Society Quarterly* 17, no. 1 (1987): 33–43.

deWinter, Jennifer. "A Bibliographic Synthesis of Rhetorical Criticism." *Rhetoric Review* 25, no. 4 (2006): 388–407.

Eyman, Douglas. "Introduction: Networks of Gaming and Writing." In *Play/Write: Digital Rhetoric, Writing, Games*, edited by Douglas Andrew Eyman and Andréa D. Davis, 3–18. Anderson, SC: Parlor Press, 2016.

McAllister, Ken S. *Game Work: Language, Power, and Computer Game Culture*. Tuscaloosa: University of Alabama Press, 2004.

Paul, Christopher A. "Process, Paratexts, and Texts: Rhetorical Analysis and Virtual Worlds." *Journal of Gaming and Virtual Worlds* 3, no. 1 (2010): 3–17.

Wark, McKenzie. *Gamer Theory*. Cambridge, MA: Harvard University Press, 2007.

Rhythm and Dance Games

Rhythm and dance games are video games that fall under the category of what could be termed the *rhythm-action genre* (Collins 2008). Gameplay is primarily focused on players repeating or coordinating rhythmic audiovisual cues in unison with the game, using either traditional console controls or additional peripheral devices. Avatars are usually of secondary importance in most rhythm and dance games. With the scrolling of rhythm and dance moves taking center stage, avatars are often relegated to background characters and rarely influence gameplay in any way.

One of the first rhythm-action electronic games is often said to be Atari's *Touch Me* (arcade version, 1974; handheld version, 1978; Collins 2008); however, it was Milton Bradley's *Simon* (1977), invented by Ralph Baer, that first saw broad commercial success. Gameplay is centered around a circular electronic device with four colored buttons (red, green, blue, yellow), each with its own harmonic tone. Players observed the audiovisual pattern displayed on the device and then attempted to repeat the pattern correctly by pushing on the appropriate button, matching color, and tone. The patterns became increasingly difficult with each turn. Although seemingly rudimentary compared with current rhythm-action video games, the basic premise remains constant in today's rhythm and dance games.

In 1988, Nintendo released the Power Pad floor mat to accompany the Nintendo Entertainment System (NES) console to be used with games such as Bandai's *Dance Aerobics* (1989) and Nintendo's *Short Order/Eggsplode* (1989). Containing more sensor spots in its dance mat than Konami's *Dance Dance Revolution* (1998), the Power Pad can be seen as an important early technical precursor to incorporating full-body movement in video game play. Another early predecessor to contemporary rhythm-action games, NanaOn-Sha's *PaRappa the Rapper* (1996), uses a similar observation/repetition gameplay technique as *Simon* but also requires the player to successfully match the timing of the repetitions.

The shift to peripheral-led music gaming is attributed to Konami's Games & Music division (later renamed the Bemani Division), with *Beatmania* (1997), a DJ-style video arcade game, later ported to home consoles in Japan and North America, which led a series of thirty-four games released between 1998 and 2007. *Beatmania* can be said to be a direct predecessor to Activision's *DJ Hero* (2009). Konami's *GuitarFreaks* (1998) soared in popularity with the release of fourteen games over the period 1998 to 2006 (Wolf 2007). However, it is Konami's *Dance Dance Revolution*, with sixteen versions of the game released over the period 1998–2006, that is often cited as being largely responsible for the increasing popularity of rhythm-action games globally (*Edge* 2010). There are several variations on rhythm and dance gameplay mechanics, such as a memory "observe and repeat" format, in which players watch a sequence and then perform it from memory; testing of coordination skills with scrolling images, such as arrows or music notes that the player has to push with the corresponding buttons on the controller in unison with the images on the screen; and freeform gameplay, in which players are free to create music or dance moves without any gameplay restrictions. Most rhythm and dance games base progression solely on the successful completion of songs that increase in difficulty level as the player progresses. However, there are a few exceptions, such as *PaRappa the Rapper*, which is essentially a narrative-based video game with rhythm-action elements within it.

Although rhythm and dance games can often be played with a standard controller for console versions, most games require specialized peripheral controllers, such as a range of musical instruments for games such as Harmonix's *Rock Band* (2007), Red Octane's *Guitar Hero* (2005), and Nintendo's *Donkey Konga*

(2003); dance mats for games such as *Dance Dance Revolution* and Codemaster's *Dance Factory* (2006); and headsets and microphones for karaoke-style games such as Konami's *Karaoke Revolution* (2003) and London Studios/Sony's *SingStar* (2004). These peripherals plug into the console and can often fully replace the traditional controller for interface navigation and gameplay.

Although video game interfaces vary depending on the title, many games show a variation of the peripheral controller on the screen. For example, *Guitar Hero*'s interface shows the image of a guitar neck with frets displaying the scrolling notes and chords players must match in sync with the game. Notes and chords are color-coded to match the console's standard controller (green, red, yellow, blue, and orange). Although the video game chords often reference chords on an actual guitar, they are often simplified for the sake of gameplay and therefore cannot be considered a guitar simulation game in the true sense. This is similar to *Dance Dance Revolution*, where the rhythmic sequences of steps are not directly correlated to actual dance moves.

Through technological development, video game controllers have shifted from game-specific devices such as *Simon* to peripheral-centric games such as *Rock Band* and *Dance Dance Revolution* that can be played on multiple consoles. With the development of motion-capture technology such as Sony's *EyeToy* (2003), a peripheral console attachment for the PlayStation 2, and Microsoft Xbox's Kinect, which included a digital camera and motion sensor, video games can be controlled by the player's body movement alone. Games such as *EyeToy: Groove* (2004) and Kinect's *Dance Central* (Harmonix, 2010) encouraged players to move their entire bodies while standing in front of their televisions; their bodies then appeared on the screen, and they attempted to hit targets that were positioned on the edge of the screen according to the rhythm of the music playing.

Other variations of gestural interfaces include Nintendo's *WiiMusic* (2008), in which players use the Wii Remote and Nunchuk to control a band on the screen (playing a possible sixty-six instruments, including both traditional and nontraditional ones), and Ubisoft's *Just Dance* (2011), which is played while holding the Wiimote. With the increase in commercial success and access to virtual reality (VR) technologies, games such as Harmonix's *Rock Band VR* (2016) offer the player a fully immersive experience. Regardless of the technology driving the experience, rhythm and dance games focus on the player's body as a core element of gameplay.

Kelly Boudreau

See also: Music

Further Reading

Collins, Karen. *An Introduction to the History, Theory, and Practice of Video Game Music and Sound Design*. Boston, MA: MIT Press, 2008, 74–79.

Picthlmair, M., and F. Kayali. "Levels of Sound: On the Principles of Interactivity in Music Video Games." Presented at the Digital Games Research Association (DiGRA) 2007 Conference: Situated Play, Tokyo, Japan, September 24–28, 2007. Available at http://publik.tuwien.ac.at/files/pub-inf_4783.pdf.

"Rhythm Attraction: The Rise of the Beatmatching Business: How Rhythm-Action Topped the Charts." *Edge*, no. E211 (February 2010): 71–75.

Steinberg, Scott. "Next-Gen Music Video Games: Real Instruments, Motion-Sensing." *Rolling Stone*, June 21, 2010. Available at https://www.rollingstone.com/music/music-news/next-gen-rock-games-real-instruments-motion-sensing-245238/.

Wolf, Mark J. P. "Arcade Games of the 1990s and Beyond." In *The Video Game Explosion: A History from PONG to PlayStation and Beyond*, edited by Mark J. P. Wolf, 135–142. Westport, CT: Greenwood Press, 2007.

Ritual

Games and rituals are both millennia-old human activities infused with human meaning-making, and because many rituals have historically taken place in religious contexts, rituals and games manifest a surprisingly deep kinship. Some ancient games, such as the Mesopotamian divination game Ur, were both religious and playful. Indeed, the function of these activities so overlaps that the difference between them is perhaps more a matter of perspective than of form or function. Because rituals and games are both contested terms that exhibit immense diversity of practice, all comparative observations must be generalizations. But even the most obvious comparisons reveal that both video games and ritual may be doing some similar things for the people who use them, performing what David Chidester (2005) calls "religious work" whether or not they are explicitly labeled as "religious." As Ronald Grimes observes, "meaningful ritual-and-media discussion becomes possible when the two domains are neither equated nor segregated but rather differentiated and conceived as sharing a common boundary" (Grimes 2006, 229).

Both rituals and video games are often concerned with storytelling. Scholars have long noticed the close relationship between myth and ritual in religious contexts, as when sacred stories are recited in a ritual context or when rituals are themselves dramatic reenactments of these stories. In such cases, there is a deep connection between the story and its ritual performance, such that the story can best be appreciated *only* in its ritually performed context. Similarly, video games are often infused with a deeply complex mythology that is revealed and enacted via the player's performance of it. Most players would be less than satisfied with mere walkthroughs or descriptions of a game's mythology. They want to perform the story, to enact it.

Rituals and video games are deeply *interactive*. Despite the contested nature of the concept of interactivity, few would deny that both games and rituals draw people in and create a feedback loop of experience. Rituals and games both depend on people *doing* them for them to be meaningful. Rituals are often driven by liturgy, or scripts, of how the ritual is to unfold. Similarly, many video games are scripted via the programming and writing behind the scenes. Both, however, require human interaction and performance for meaning to arise and for the "script" to become something more than the potential for experience. And both, one could argue, shape the performer through his or her movement through the scripted experience. Thus, both video games and rituals are “emergent” in the sense that meaning arises via play or performance and depends on the inputted actions of the player-performer.

This idea of *performance* is an important one for game players and ritual theorists and is of course deeply tied in with storytelling and interactivity. For some ritual theorists, the term *ritual* is replaced by the term *performance* or *ritualization* as a means of emphasizing the interactivity—the configuration or procedurality—involved in a ritual. As ritual theorist Roy Rappaport notes, “Performance as well as formality is necessary for ritual” (Rappaport 1996). That is, *doing* as well as scripting is required. For many ritual theorists, it is not a ritual if it is not being performed. Video game players and designers could similarly argue that it is not a game until someone is playing it. This comparison raises the question of what we should call a video game when it is not being played or while it is in development. Is it still a game? Or is it merely a script, liturgy, or potential performance?

Some scholars of ritual are concerned with whether rituals convey a message to people, either to the performers or to those watching the ritual. This concern echoes similar questions in video game theory about whether games *teach* us how to view the world or what to do in it, or whether they teach us anything at all. The arena of ritual, interestingly, is often viewed as imbued with deep meaning with consequences beyond the ritual itself—even if the impact is simply the maintenance of societal status quo. Rituals are believed by many, scholars and ordinary folk alike, to *tell* us something about how the world works, to help us learn foundational stories, or to reaffirm some sense of cosmic structure and order. The arena of gameplay, however, is often seen by players as having little to no meaningful effect on life beyond the game, apart from perhaps some sense of cathartic purging of emotions or an appreciation for camaraderie achieved in multiplayer games. Yet, both rituals and video games are performative; they invite our investment in a sort of what-if scenario that shapes our investment in a given worldview, and both invite us to *do* things. It seems hard to deny that both rituals and video games, then, have some effect on how we see ourselves and the world. So do games and rituals communicate anything to player-performers or observers? This argument is far from settled, but the comparison of rituals and games invites new consideration of how such messages may be delivered through performance and through play.

Both rituals and games are defined by rules, or structures, that regulate and limit performance, shaping the player-performer’s experience. Ritual theorist Stanley Tambiah (1985) points out the formalized structure of many ritual experiences, describing rituals as “constituted of patterned and ordered sequences of words and acts, often expressed in multiple media” (128), with content that is arranged with differing degrees of formality, stereotyping or fixedness, fusion of disparate elements, and repetition (Tambiah 1985). In this sense, rules are the structure-providing mechanisms that shape experience. Ritual theorists typically do not use terms like *rules* to apply to the ritual performance, preferring rather to think about *formality* and *repetition,* but in a performative sense, both games and rituals indeed set limits on what we can do and what we cannot to give shape and structure to the emerging experience. Both also draw on previous stereotypes or genre specifications, creating expectations and familiarity in performer-players, who know what to do in new manifestations of the game or ritual because they have seen this kind of thing before. Rules tell us how to see things by telling us what is and is not possible. If there is anything to the claim that both rituals and video games can shape our view of the world, then looking at what the rules are in any ritual or gaming experience could tell us something about what we are meant to derive from the experience. This, in turn, should enable us to be critically aware participants in *any* rule-based environment.

Some important things are gained by a comparison of rituals with video games. Both experiences are concerned with storytelling and are interactive, performative, communicative (perhaps), and defined by rules. This means that both can also be viewed as mere forms of play or as serious shapers of our worldviews. We can also note that although it may seem to some that religion is on the decline, human beings are notoriously creative, imaginative creatures and will find ways to craft meaningful experiences whether or not we feel comfortable labeling them "religious."

Rachel Wagner

See also: Replay and Repetition

Further Reading

Chidester, David. *Authentic Fakes: Religion and American Popular Culture*. Berkeley: University of California Press, 2005.

Grimes, Ronald. *Rite Out of Place: Ritual, Media and the Arts*. Oxford, UK: Oxford University Press, 2006.

Huizinga, Johan. "Nature and Significance of Play as a Cultural Phenomenon." In *The Game Design Reader*, edited by Katie Salen and Eric Zimmerman, 96–121. Cambridge, MA: MIT Press, 2003.

Rappaport, Roy. "The Obvious Aspects of Ritual." In *Readings in Ritual Studies*, edited by Ronald Grimes, 427–440. Upper Saddle River, NJ: Prentice Hall, 1996.

Tambiah, Stanley. *Culture, Thought and Social Action: An Anthropological Perspective*. Cambridge, MA: Harvard University Press, 1985.

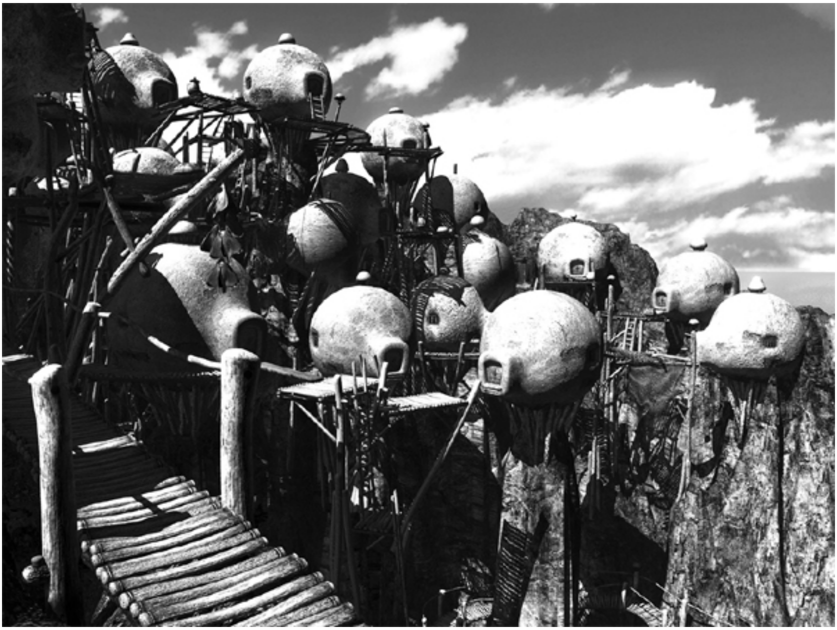
Wagner, Rachel. *Godwired: Religion, Ritual and Virtual Reality*. New York: Routledge, 2011.

Riven

Cyan's game *Riven: The Sequel to Myst* (1997) surpassed its predecessor, *Myst* (1993), in size and scale, containing more than four thousand screens of graphics on five CD-ROMs. It was the best-selling game of 1997 but did not pass *Myst*. *Riven* is notable for the beauty of its design, the integration of puzzles into its world and storyline, and the mood and atmosphere of its various locations, all of which demonstrated that video games could be art.

Riven continues the story of *Myst* and begins with Atrus sending the player to

Riven, where his father, Gehn, has imprisoned Atrus's wife, Catherine. Gehn is himself imprisoned on Riven, although he can travel to the smaller worlds, or Ages, for which he has written descriptive books and linking books. Riven is itself one of Gehn's worlds, and its design reflects his personality and ambitions. Atrus gives the player a linking book, which is really a one-man prison that can be used to capture Gehn. Thus, unlike *Myst,* the player begins the game with two objectives: capture Gehn and free Catherine. Once the player arrives on Riven, however, the prison book is stolen by one of Gehn's guards and then stolen again by a member of the Black Moeity, a rebel group fighting against Gehn that is composed of the indigenous Rivenese villagers. This gives the player a third objective that must be completed before the other two can be—the retrieval of the prison book.



The huts of the villagers on Jungle Island in *Riven* (Cyan Worlds, 1997). (Courtesy of Mark J. P. Wolf)

Much of *Riven*'s gameplay involves exploring the five islands that make up Riven and learning their geography as well as learning to operate the machinery and gain entry into various buildings and locations. Many small details are significant as clues in *Riven,* and scenery is often staged in depth, allowing a distant view of places and things that tantalize the player into finding a way to get to them. As in *Myst,* important clues can be found in such things as characters' journals, geographic layouts, maps, and other devices, and deciphering several connected layers of clues is sometimes necessary to solve puzzles. Along the way, the player learns more about Gehn, who becomes more than simply *Riven*'s villain, and there is also a visit to Tay, the rebels' own Age, and the 233rd Age, where Gehn has his office and bedroom.

The smooth integration and diegetic motivation for *Riven*'s puzzles, the care given to the design and rendering of all its details, the engaging storyline that slowly reveals character and backstory, and the attention paid to lighting, sound, composition, music, mood, and atmosphere all position *Riven* at the pinnacle of contemplative single-player adventure games and result in an artistic work that has yet to be surpassed. *Riven* was followed by three more *Myst* games, *Myst III: Exile* (2001), *Myst IV: Revelation* (2004), and *Myst V: End of Ages* (2005), as well as the multiplayer *Uru: Ages beyond Myst* (2003).

Mark J. P. Wolf

See also: Cyan Worlds; *Myst*

Further Reading

Wolf, Mark J. P. *Myst and Riven: The World of the D'ni*. Ann Arbor: University of Michigan Press, 2011.

Rockstar Games

Rockstar Games is a video game publishing label and developer that is best known for its *Grand Theft Auto* games. Formed in December 1998 as a subsidiary of Take-Two Interactive Software, Rockstar is headquartered in New York City but also has development studios in Canada, India, the United Kingdom, and elsewhere in the United States.

Rockstar Games was conceived by the company's president, Sam Houser, as "an elite gaming brand," similar in attitude to the record label Def Jam. The label was also envisaged as a home for games that draw on inspiration from contemporary popular culture and openly shun the cartoon, science fiction, and fantasy themes often associated with video games. To underline this image, the company's marketing often focused on courting mainstream media attention and stoking controversy.

In addition to the best-selling *Grand Theft Auto* series, games published by Rockstar include *Thrasher Presents Skate and Destroy* (1999), *Midnight Club: Street Racing* (2000), *Smuggler's Run* (2000), *Max Payne* (2001), *State of Emergency* (2002), *Manhunt* (2003), *Red Dead Revolver* (2004), *The Warriors* (2005), *Rockstar Presents Table Tennis* (2006), *Bully* (2006), *Red Dead Redemption* (2010), *L.A. Noire* (2011), *Max Payne 3* (2012), and *Red Dead Redemption 2* (2018).

Initially, the company existed only as a publishing label, but in its first twelve months, it acquired DMA Design, the UK studio behind *Grand Theft Auto,* and took charge of Take-Two's studio in Oakville, Ontario, Canada, and renamed it Rockstar Canada. Edinburgh-based DMA Design was renamed Rockstar North in May 2002 following the success of *Grand Theft Auto III* (2001). That same year, British developer Tarantula Studios was moved into Rockstar by Take-Two and became Rockstar Lincoln. Rockstar also bought Barking Dog Studios, which became Rockstar Vancouver, and Angel Studios, which became Rockstar San Diego. The company continued expanding its development capacity over the next few years with the addition of Rockstar Vienna (2003), Rockstar Leeds (2004), and Rockstar London (2005).

On June 9, 2005, Patrick Wildenborg released the unauthorized "Hot Coffee" mod for the Windows version of *Grand Theft Auto: San Andreas* (2004). The mod gave players access to an otherwise inaccessible sex minigame that the company had abandoned work on prior to the game's release. Rockstar never intended for the minigame to be accessible to players, and its discovery sparked a high-profile political backlash in the United States that resulted in major retailers removing the game from their shelves, class action lawsuits, and the game's age rating to be increased from Mature to Adults Only. In response, Rockstar recalled the game, removed the offending code, and then reintroduced the game so that it could revert to its original Mature rating and regain acceptance from retailers.

ROCKSTAR NORTH

Rockstar North headquarters building, in Edinburgh, United Kingdom. (Serge Cornu/ Dreamstime.com)

The Hot Coffee controversy also prompted the passing of a law in California prohibiting the sale of video games with violent and sexually explicit content to minors (under eighteen years of age). The Entertainment Software Association challenged the law, which eventually led to a U.S. Supreme Court ruling confirming that the U.S. Constitution's free speech rights apply to video games.

As the industry changes, new branches of the company have opened and closed. In 2006, the company shut down Rockstar Vienna. In 2008, Rockstar acquired Mad Doc Software of Andover, Massachusetts, and renamed it Rockstar New England. In 2012, Rockstar Vancouver was closed. In 2016, the company established Rockstar India in Bangalore.

The label's formula continues to prove successful as illustrated by *Red Dead Redemption 2* achieving sales of more than $750 million in just three days. A feat Rockstar says is the second-biggest opening weekend of any entertainment product, after its own *Grand Theft Auto V* (2013), which made over $1 billion in its first three days of release.

Tristan Donovan

See also: *Grand Theft Auto* Series; Houser, Sam and Dan

Further Reading

Kushner, David. *Jacked: The Unauthorized Behind-the-Scenes Story of Grand Theft Auto*. Hoboken, NJ: John Wiley & Sons, 2012.

Rockstar Games. "*Red Dead Redemption 2* Achieves Entertainment's Biggest Opening Weekend of All Time." Business Wire, October 30, 2018. Available at https://www.businesswire.com/news/home/20181030005459/en/Red-Dead-Redemption-2-Achieves-Entertainment%E2%80%99s-Biggest.

Rohrer, Jason (1977–)

Active in game design since the early 2000s, Jason Rohrer is best known for the game *Passage* (2007), his third game as a solo developer, and for the role that it has played in the evolving cultural discourse about video games as art. Including *Passage*, Rohrer has developed over ten games that, often through deceptively simple gameplay, imagery, and sound, explore the expressive capacities of the medium of the video game.

Passage is displayed in an unusual 25:4 aspect ratio (100-by-16 pixels), which creates the impression of a narrow horizontal corridor. Players control an avatar, modeled on Rohrer himself, who walks through the game's world, exploring spaces, encountering obstacles, and opening treasure chests. Over a playtime of five minutes, the character gradually ages and, finally, dies. Early on, players have the option of taking on a companion, identified in the game's sprite set as "spouse," who will accompany them on their explorations. Near the end of the game, the spouse predeceases the player character, who then goes on alone. All of this is represented through pixelated graphics—the characters are eight pixels tall, half the height of the overall image—and rudimentary animations accompanied by a plaintive synthesizer tune featuring a vaguely martial snare beat.

When *Passage* was released in 2007, a debate about the artistic legitimacy of video games had been simmering for some time. *Passage* got a boost in visibility when, in a presentation at the 2008 Game Developers Conference, Ubisoft's *Far Cry 2* (2007) creative director, Clint Hocking, declared *Passage* a "game that made me cry." While there is much more to the game than its lachrymose qualities, many players have indeed been moved to tears—and to new understandings of the expressive potential of video games—by *Passage*.

Rohrer is known for having practiced an asceticism that he calls “voluntary simplicity” in his own life. His games can be pointedly simple, but they are not exactly ascetic. Rather, throughout his career, Rohrer has exhibited an impetus in his creative output to reach for new modes of expression through experimentation with game form. Some of the games favor allegory; *Gravitation* (2008) uses a variable aspect ratio and changes in character ability to express mania, while *Inside a Star-Filled Sky* (2011) imagines the infinite through a shoot ’em up game with a recursive, nested level structure. Some recent games are more literal in their representations of the situations they depict. *The Castle Doctrine* (2014) is a multiplayer game in which players alternately fortify their own homes against burglars and set out to rob the houses of other players, and in *Diamond Trust of London* (2012), players participate in the deceptive practices of the international diamond trade.

Rohrer’s games have played a crucial role in the cultural legitimation of video games as an art form, and his work has accordingly been exhibited in culturally validated venues previously inaccessible to game designers, most notably in the acquisition of *Passage* for the permanent collection of the Museum of Modern Art (MoMA).

Daniel Reynolds

See also: Art, Video Games as

Further Reading

Anable, Aubrey. “Introduction.” In *Playing with Feelings*, vii–xxi. Minneapolis: University of Minnesota Press, 2018.

Fagone, Jason. “The Video-Game Programmer Saving Our 21st-Century Souls.” *Esquire*, November 20, 2008. Available at https://www.esquire.com/news-politics/a5303/future-of-video-game-design-1208/.

Frome, Jonathan. “Video Game Sadness from *Planetfall* to *Passage*.” In *Video Games and the Mind: Essays on Cognition, Affect, and Emotion*, edited by Bernard Perron and Felix Schröter, 158–173. Jefferson, NC: McFarland & Co., 2016.

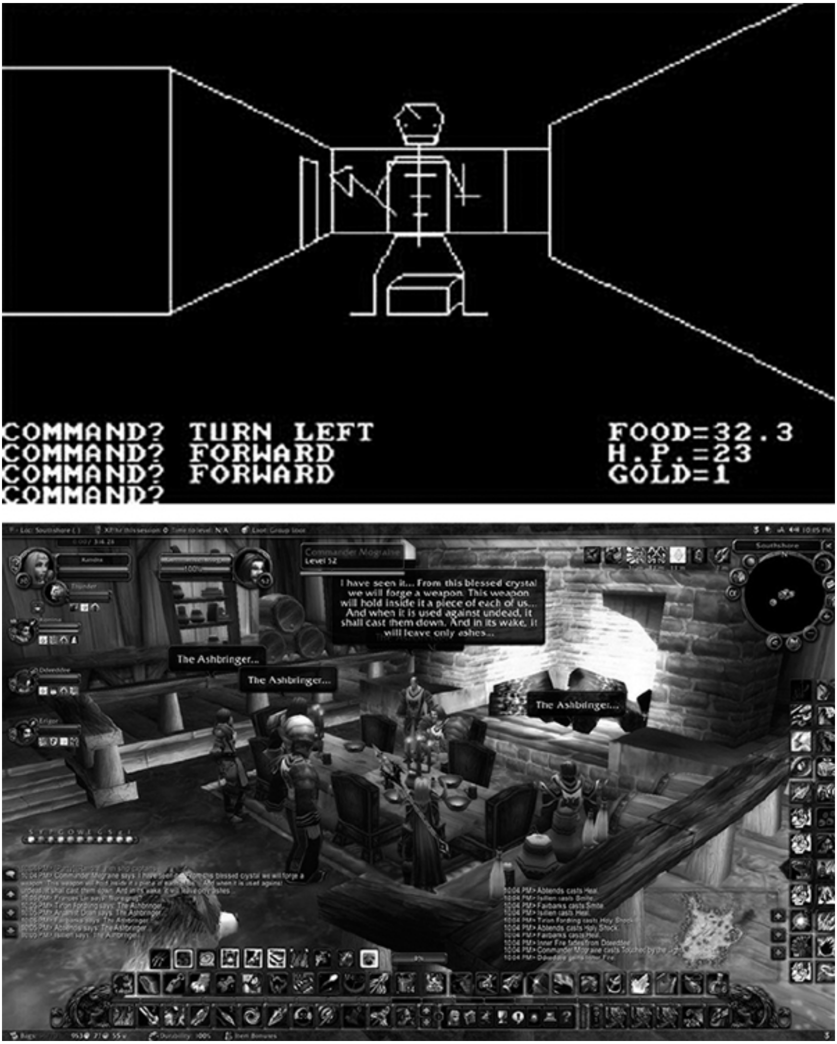
Larson, Sarah. “Jason Rohrer and the Art of the Video Game.” *The New Yorker*, June 23, 2016. Available at https://www.newyorker.com/culture/culture-desk/jason-rohrer-and-the-art-of-the-video-game.

Rohrer, Jason. “Jason Rohrer”. Source Forge. Last updated on March 12, 2018. Available at http://hcsoftware.sourceforge.net/jason-rohrer/.

Role-Playing Games (RPGs)

Role-playing games (RPGs) have a complex history rooted in fantasy literature, interactive storytelling, and miniature wargames. The first RPGs were of the tabletop (also known as pen-and-paper) variety, meaning that they are typically played together by a small team, headed by a game master. Dungeons & Dragons (D&D), developed by Gary Gygax and Dave Arneson in 1974, was the first commercial RPG and a major influence on the development of the genre. In RPGs, players each adopt the roles and control the actions of their own fictional characters (player characters [PCs]) living in a fictional game world, and the game master describes the world and the actions of non-player characters (NPCs). Much of the conflict resolution, such as battle events or tests of skill, is conducted according to a set of rules and a random element, arbitrated by the use of many-sided dice. Character sheets, rulebooks, and other materials may be used to facilitate play, and there are many individual styles of role-playing, some of them more free form and others more rules oriented. There also exists a version of RPG known as live-action role-playing (LARP), which may involve acting in character, wearing period costumes, and staging the location like a theater production, with fantasy- or science fiction–style props and special effects.

Computer role-playing games were partially derived from tabletop RPGs, although there were also other influences and close ties to the development of such game genres as text adventures and computer strategy games. It is somewhat debatable what makes a “genuine” computer RPG; one feature that is commonly considered a defining one is that all RPGs have PCs with quantifiable features (digital equivalents of the character sheets used in tabletop-style RPGs), and character progression is used as a central measurement of success. Traditional RPG rule systems often include *experience levels*, meaning that successful advancement in the game translates into *experience points* through which a PC can *level up* to new powers and skills. Other skill and training systems may be used, but the focus on improving one’s PC nevertheless remains one of the typical features of computer and console RPGs. Regardless of formal similarities, a single-player digital RPG is a very different experience from that provided by traditional tabletop RPGs. The element of “playing a role” or acting in character is largely lost; instead, various puzzles or quest structures (tasks assigned to a player character) are used to guide the player through plot-driven gameplay.



```
COMMAND? TURN LEFT                FOOD=32.3
COMMAND? FORWARD                  H.P.=23
COMMAND? FORWARD                  GOLD=1
COMMAND?
```

I have seen it... From this blessed crystal we will forge a weapon. This weapon will hold inside it a piece of each of us... And when it is used against undead, it shall cast them down. And in its wake, it will leave only ashes...

The Ashbringer...

The Ashbringer...

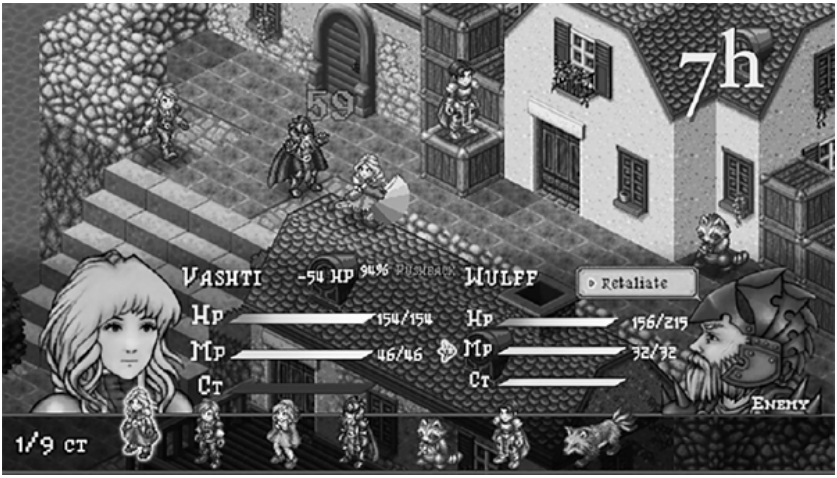
The Ashbringer...

***Akalabeth* (Richard Garriott, 1979) [top] and *World of Warcraft* (Blizzard, 2004) [bottom]. (Courtesy of Mark J. P. Wolf)**

Some of the most popular computer RPG series include the *Ultima* series (begun with *Akalabeth*, 1979), the *Wizardry* series (1981–2001), and the *Might and Magic* series (1986–2002). These were preceded in the 1970s by early dungeon crawl games that were often created for university computer systems, such as *dnd* (developed by Gary Whisenhunt and Ray Wood, 1974–75) for PLATO at the University of Illinois and *Rogue* (1980). Often reliant on text, these games were implemented as a digital translation of the core elements in Dungeons & Dragons gameplay: a player creates an adventuring character and then proceeds to explore some caves filled with monsters and treasure.

Computer RPGs became increasingly complex during the 1980s and 1990s, with expanding game worlds and improving graphical and sonic features. These increasingly complex computer RPGs provided players with richer interaction options by handing them an entire team of adventurers to control rather than a single player character. Video games spun off on their own evolutionary track in the early 1980s with the release of console RPGs, such as *Dragonstomper* (1982) for the Atari VCS 2600 and *Dragon Quest* (1986) for the Nintendo Entertainment System (NES), with gameplay based on models set by the early *Ultima* and *Wizardry* games, combining turn-based battles with a heavy emphasis on narrative and character development. There exist today several national or cultural varieties of RPG game design, of which the contrast between the linear Japanese RPGs and Western open-ended RPGs is a prominent example.

Multiplayer computer RPG gameplay was first implemented in early multiplayer dungeon crawls, such as *Avatar* (1977–79) in the PLATO system. The first multiplayer RPG with a persistent virtual world was *MUD* (*Multi-User Dungeon*), created by Roy Trubshaw and Richard Bartle in 1978–80. Combined with a graphical interface, MUDs (multiuser domains/dungeons/dimensions) later evolved to massively multiplayer online role-playing games (MMORPGs), of which *World of Warcraft* (*WoW* [2004]) is the most popular contemporary example. A subgenre of action RPGs has also evolved in which all game events are acted out in real time. For example, in *Diablo* (1996), the debt to early *Rogue*-like dungeon games is clear, the most important shared element being the randomly generated dungeon levels. When adapted into a multiplayer game, this kind of action RPG is also in principle suitable for competitive tournament play; however, the popular esports phenomenon has largely evolved with real-time strategy (RTS) games (such as first-person shooters [FPSs]) rather than with RPGs. Single-player computer RPGs still remain popular, including several game series with richly detailed fictional and narrative worlds, including *Fallout* (1997), *Baldur's Gate* (1998), *Neverwinter Nights* (2002), *Star Wars: Knights of the Old Republic* (2003), *Fable* (2004), *The Elder Scrolls V: Skyrim* (2011), and *The Witcher 3: Wild Hunt* (2015).



A screenshot from the role-playing game *Arcadian Atlas*, which was part of a Kickstarter campaign. (Courtesy of Mark J. P. Wolf)

The essence or *true* character of RPGs is frequently debated by fans of the genre. Some emphasize the primacy of role-play; others believe it is the gameplay element. The early D&D adventure scenarios were often designed and played out in a conflict-oriented hack-and-slash style, where the battles were the core element and immersion into the player character was considered secondary. Some players had different priorities, and thus potential for disagreement existed as to the goal and purpose of RPGs. One prominent formulation of these views was developed by the RPG community in an online discussion (in the rec.games.frp.advocacy Usenet news group) and later published by John H. Kim as “The Three-Way Model” (also known as the Threefold Model) (1998). This model distinguishes between three popular styles of role-playing: a *dramatist* is playing the game to produce a satisfying storyline; a *gamist* player is focused on overcoming satisfying challenges; and, finally, a *simulationist* is someone who emphasizes the internal consistency of events within the world of the game. This last RPG player category later became known as the *immersionist*, where the emphasis is on the player getting involved with the lives of fictional RPG characters, even feeling the characters’ feelings. In comparison, Richard Bartle (1996) has analyzed how the main player types in MUDs form four distinctive categories: *achievers* (who play to master the game), *explorers* (who play to experience the game world), *socializers* (who play to interact with other people), and *killers* (who want to use their powers to humiliate other people).

The designers and producers of computer RPGs can be seen to cater to this diversity of player preferences in various ways. The original *Diablo* (1997) style of action RPGs focuses on battles and equipment and thus best serves players with gamist or achiever priorities in gameplay. Most of the popular computer RPGs, such as *Mass Effect* (2007) and the other popular single-player RPG series previously mentioned, combine action, puzzle, and narrative elements in a manner that makes them appeal to a broad range of different kinds of players. In addition, as genre features have started to mix, RPGs often have the traits found in many kinds of games rather than those of a separate genre of its own. For example, the popular *sandbox* games, such as the *Grand Theft Auto* series, also include evolving player characters, rich interactions with numerous NPCs, and quest (task) structures much in the style of single-player RPGs.

There are some clear overlaps or mutual influences as well when the development of strategy games is considered, with *Warcraft III: Reign of Chaos* (2002) an example of a wargame that includes individual, evolving "hero" characters as well as nonindividualized troop units. Adventure games also continue to have many similarities with RPGs in the story-driven character of gameplay in particular; however, they do not focus on player-created characters to the same degree. It should be noted that the online RPG space has also continued to expand with the introduction of virtual worlds such as *Second Life* (2003) and *Habbo Hotel* (2000; now *Habbo*). Many of these environments do away with gameplay elements entirely, becoming purely graphical chat services.

The combination of gameplay challenges, fictional worlds and characters, and online social interactions with real people provides a rich blend of attractions that help online RPGs remain popular. The MMORPG subgenre also displays continuing popularity, with *WoW* having seven major expansion packs released (with *Battle of Azeroth* released in 2018). In casual games, simplified versions of RPGs have been released and marketed as both social and mobile game versions.

Frans Mäyrä

See also: Massively Multiplayer Online Role-Playing Games

Further Reading

Barton, Matt. *Dungeons and Desktops: The History of Computer Role-Playing Games*. Wellesley, MA: A. K. Peters, 2008.

Fine, Gary Alan. *Shared Fantasy: Role-Playing Games as Social Worlds*. Chicago: University of Chicago Press, 1983.

King, Brad, and John Borland. *Dungeons and Dreamers: The Rise of Computer Game Culture from Geek to Chic*. New York: McGraw-Hill/Osborne, 2003.

Montola, Markus, and Jaakko Stenros, eds. *Beyond Role and Play: Tools, Toys and Theory for Harnessing the Imagination*. Helsinki, Finland: Ropecon, 2004. Available at https://nordiclarp.org/w/images/8/84/2004-Beyond.Role.and.Play.pdf.

Wardrip-Fruin, Noah, and Pat Harrigan, eds. *Second Person: Role-Playing and Story in Games and Playable Media*. Cambridge, MA: MIT Press, 2007.

Williams, J. Patrick, Sean Q. Hendricks, and W. Keith Winkler, eds. *Gaming as Culture: Essays on Reality, Identity and Experience in Fantasy Games*. Jefferson, NC: McFarland, 2006.

Romania

Although video games have been a popular entertainment medium in developed countries since as early as the late 1970s, in Romania, they began to emerge as an important part of youth culture only after the fall of communism in 1989. After Nicolae Ceau§escu's visit to North Korea in 1971, communism in Romania took a nationalist and isolationist turn, and the already feeble cultural relations with the capitalist world were severed (Boia 2017, 153). As a result, in the 1980s, when video games were gaining momentum in the form of arcade games and home consoles, they were inaccessible to the general public in Romania.

After the fall of communism, video games started to penetrate the Romanian entertainment market, but they had to adapt to the particularities of an emerging deregulated capitalist system. In the context of a nonexisting middle class and the huge inflation experienced by the Romanian economy in the 1990s (Niculescu 2001, 183), authentic games and gaming platforms were scarce. However, because copyright law was not enforced, the average Romanian could purchase affordable clones of Nintendo Entertainment System (NES) consoles, the most popular being the Terminator 2, and pirated games, which were sold more or less clandestinely on stands in markets and sometimes even in stores. (Because these games were counterfeit copies bought from mostly unauthorized distributors, neither buyers nor sellers were really sure what games they were buying or selling, as the cartridge covers only partially matched the game inside. Usually, the name on the cover pointed to the right game series, but the installment was rarely indicated correctly.) Therefore, while fifth-generation consoles such as the Sony PlayStation and the Nintendo 64 were enjoying much success in developed countries, most gamers were still using third-generation consoles in Romania. Nevertheless, one has to acknowledge that this lag was not necessarily detrimental for the gaming community, as Romanian gamers were now recuperating the decade of gaming history that they had missed.

Toward the end of the 1990s, many Romanians could finally afford personal computers. This paved the way for PC games in Romania, which were also bought from clandestine distributors who owned CD writers and sold cracked and pirated copies of original games. By the turn of the millennium, the local gaming community had made important steps in synchronizing itself with the global gaming culture, in that gamers in Romania now played the same games as those abroad. However, console games were still unpopular among Romanians who were at odds with buying a gaming platform that could not run pirated copies of games. (Alternatively, one could have his or her console hacked; however, authentic games could not then be run on it, and there was always the danger of hacked consoles not running properly.)

Technological progress, cheaper CD and DVD writers, and the spreading of internet availability across the country (in 2018, the internet connection speed in Romania was ranked as being one of the fastest in the world [Melenciuc 2018]) made games in the 2000s readily accessible to anyone with a PC and a broadband internet connection. The enforcement of copyright law was still weak, and so PC users could illegally download any game they desired. The popularization of emulators also enabled PC users to play games that had only been released for the PlayStation, PlayStation 2, Nintendo GameCube, and other consoles. However, the heyday of video game piracy would not last forever.

After 2004, and especially after Romania joined the European Union in 2007, the country witnessed considerable economic growth as a result of European aid funds, foreign investments (Deacu 2017), and the massive amount of foreign currency that the Romanian diaspora sent home to their relatives. This led to the creation of an urban Romanian middle class that, despite the global economic recession that started in 2009 and reached its peak in Romania in 2011, has continued to thrive and has afforded authentic gaming products. This growing Romanian middle class enabled the emergence of a legal games market, which, along with the new means used by developers to prevent illegal copies and cracking, has made buying authentic copies of games the norm. (One of the most efficient ways by which developers prevent the use of illegal copies is the requirement of an online login, not only for multiplayer but also single-player mode.)

Romanian gaming culture has changed significantly in the past years, and this can be observed in the social practices surrounding gaming and the attitudes toward video games. Because piracy is no longer the norm, many young middle-class gamers lack the technical skills required to download a pirated version of a video game, find the right crack, and solve all the issues that can crop up when running a pirated copy. On the other hand, in the rural and poorer areas of the country, the social practices related to piracy are more likely to linger on.

Romanians have not only been at the receiving end of the video game industry; they have also been involved in the creation of video games. Important video game companies such as Ubisoft, Electronic Arts (EA), and Gameloft have opened branches in Romania over the past years, with Ubisoft coming to Romania as early as 1992. Some of the important video game series that Romanian studios have helped develop are *Assassin's Creed* and *FIFA*.

Andrei Nae

See also: Europe (Central and Eastern)

Further Reading

Boia, Lucian. *Istorie şi mit în conştiinţa românească*. Enhanced illustrated ed. Bucharest, Romania: Editura Humanitas, 2017.

Deacu, Elena. “Bilanţul economic al celor 10 ani de la intrarea României în UE. Cât ne-a ajutat Uniunea Europeană.” *Adevărul*, April 28, 2017. Available at https://adevarul.ro/economie/bani/bilantul-economic-celor-10-ani-intrarea-romaniei-ue-ne-a-ajutat-uniunea-europeana-1_590340aa5ab6550cb8a021de/index.html.

Melenciuc, Sorin. “Romania Has the 5th Fastest Internet in the World.” *Business Review*, July 13, 2018. Available at http://business-review.eu/news/romania-has-5th-fastest-internet-speed-in-the-world-176801.

Niculescu, Niculae. *Ecuaţia economic politic în România 2000*. Bucharest, Romania: Editura Economică, 2001.

Ubisoft Bucharest. Ubisoft website. Accessed October 2, 2020. Available at https://www.ubisoft.com/en-US/studio/bucharest.aspx.

Romero, Brenda (1966–)

Brenda Romero is an American game designer and developer. She began her career in the industry as a tester at Sir-Tech Software in 1981, working in a variety of roles on the company's *Wizardry* series of role-playing games (RPGs) and ultimately designing *Wizardry 8* (2001), which *Computer Gaming World* named RPG of the year. After leaving Sir-Tech, she worked on console adaptations of *Dungeons & Dragons* games at Atari and then on *Playboy: The Mansion* (2005) for Cyberlore Studios. Her research for the game formed the backbone of a book on the subject, *Sex in Video Games* (Charles River Media, 2008), which considers the history of sex in video games along with ethical concerns and worries about censorship. Afterward, she worked as creative director for Slide and then Lolapps before leaving to join the social media game company Loot Drop, which she cofounded with John Romero in 2010.

Romero has brought her game design expertise to university settings, first serving as chair of the Savannah College of Art and Design Interactive Media and Game Development department and then as designer in residence for the Games and Playable Media Program at the University of California at Santa Cruz. She cofounded independent game company Romero Games with her husband, John Romero, in 2015 and is currently program director of the MSc program in Game Design and Game Development at the University of Limerick. With Ian Schreiber, she is the coauthor of two books, *Challenges for Game Designers: Non-Digital Exercises for Video Game Designers* (Charles River Media, 2008) and *Breaking into the Game Industry: Advice for a Successful Career from Those Who Have Done It* (Cengage Learning, 2011).

In addition to her work in digital games, Romero has received critical acclaim for her tabletop game designs, many of which are under the series umbrella of "The Mechanic is the Message," a reference to media theorist Marshall McLuhan. These games raise serious questions about morality, history, and social issues. Romero designed the first of these games, *The New World* (2008), to explain the horrors of the slave trade, and in particular the Middle Passage, to her daughter. *Train* (2009) is a board game about the Holocaust that considers players' complicity in systems. It has been exhibited internationally, covered extensively in the press, and was recognized with the 2009 Indiecade Vanguard Award. The other completed game in the series is *Sîochân Leat* (2009), which traces Romero's family history, beginning with the Cromwellian war in Ireland. Several other games are in development, including *Mexican Kitchen Workers*, which exists as a prototype.

In 2006, *Next Generation* named Romero one of the 100 Most Influential Women in the Game Industry, and in 2008, Gamasutra listed her in its Top 20 Women in Games. She has also been recognized with the Game Developers Choice Awards Lifetime Achievement Award in 2013, the Game Developers Ambassador Award in 2015, Develop: Brighton's Development Legend Award, and a British Academy of Film and Television Arts Special Award in 2017. In 2018, *PC Magazine* listed her as one of the 10 Most Influential Women in Game Development.

Jennifer deWinter and Carly A. Kocurek

See also: Id Software

Further Reading

Kafaie, Yasmin B., and Carrie Heeter. "Interview with Brenda Braithwaite, Savannah College of Art and Design." In *Beyond Barbie and Mortal Kombat: New Perspectives on Gender and Gaming*, edited by Yasmin B. Kafaie and Carrie Heeter, 337–344. Cambridge, MA: MIT Press, 2008.

Parkin, Simon. "How Making Games Helped Her Deal with Evil." Kotaku, June 24, 2014. Available at https://kotaku.com/brenda-romeros-quest-for-healing-1595394683.

Touris, Maurizio Vitale, and Nicholas Chaput. "Oral History Interview: Brenda Romero and John Romero." In *The Oral History of Video Games 2016*. Available at https://digitalcommons.wpi.edu/iqp-all/3286/.

Ross, Bonnie

Bonnie Ross is an American game developer who has worked as a producer, executive producer, and general studio manager before founding and assuming the role of corporate vice president of 343 Industries. Ross graduated from Colorado State University, where she majored in technical communication with minors in physics and computer science. In 1994, she began working at Microsoft in production in their newly created PC sports gaming division, which led to her first game release, *NBA Full Court Press* (1996). During her time in the Microsoft Game Studios, Ross codeveloped or published a slew of successful titles, including *Counter-Strike* (1999) for Xbox, *Jade Empire* (2005), *Psychonauts* (2005), *Gears of War* (2006), *Mass Effect* (2007), and *Zoo Tycoon* (2001), among others.

In 2007, Bungie—creators of the *Halo* franchise—parted ways with Microsoft to create new games, and Ross responded by creating 343 Industries, a subsidiary company that oversees the entirety of Microsoft's highly successful *Halo* game franchise. Already a fan of the *Halo* franchise, Ross saw the strength in the title in the narrative tie-ins and character development as well as the large open world that needed further exploration. She has brought to market a number of well-loved titles in the universe: *Halo 3: ODST* (2009), *Halo: Reach* (2010), *Halo: Combat Evolved Anniversary* (2011), *Halo 4* (2012), *Halo: Spartan Assault* (2013), *Halo: The Master Chief Collection* (2014), *Halo: Spartan Strike* (2015), *Halo 5: Guardians* (2015), *Halo Wars 2* (2017), *Halo: Fireteam Raven* (2018), and *Halo Infinite* (2020). In addition to the games, Ross oversees a transmedia approach to the brand, helping to create the *Halo* television series for Showtime and maintaining the book tie-ins, many of which have been named *New York Times* Best Sellers. She credits the strength of the fan community with the transition and strengthening of the brand.

In 2014, Ross was promoted to the title of corporate vice president at Microsoft, remaining in leadership of 343. During her time at Microsoft, she cofounded the Microsoft Women in Gaming community to facilitate networking and mentoring for women in the industry. She also speaks at middle schools and high schools to encourage girls and young women to see games as a creative practice and the technologies associated with creation as intimately involved with expression and creativity rather than an alienating technology. She has further instituted a lifetime ban on Xbox Live to those who make discriminatory comments, arguing that game developers have a personal responsibility to create an inclusive and respectful community.

Ross was included in *Fortune* magazine's 10 Powerful Women in Video Games in 2014 and was inducted into the Academy of Interactive Arts and Sciences Hall of Fame in 2019.

Jennifer deWinter and Carly A. Kocurek

See also: Microsoft Xbox

Further Reading

Takahashi, Dean. "Master Chief's Guardian, Bonnie Ross, Talks about Halo and Diversity." Venture Beat, December 18, 2018. Available at https://venturebeat.com/2018/12/18/master-chiefs-guardian-bonnie-ross-talks-about-halo-and-diversity/.

RPGs. *See* Role-Playing Games

Rules

Linguistically, the word *rule* has three meanings in relation to play: that of a guideline, standard, or regulation (mostly directive of actions); that of a rational regularity (mostly directive of thought); and that of a predictable, periodic recurrence of phenomena (mostly directive of perception). Rules of video games fall into the first category and are therefore close to regulations and standards for social behavior, such as traffic rules or etiquette. Rules of a game can be seen as a set of recurring instructions, the validity of which appears to be set but that can be terminated, changed, or overruled at any time, as long as these changes occur by mutual consent of all participants. However, at the same time, the rules of a game are interwoven with the general idea of *gaming*. Depending on the general conceptualization and definition of *game*, the significance and evaluation of rules change.

In German idealism (such as Schiller or Kant), free play (without rules) is perceived as emancipatory because people are able to interact playfully with the world through trial actions without fear of consequences. The absence of rules during free play, and the self-referentiality of the game, amount to its significance. This concept of the ideal and liberating game is opposed to the functional idea of the game. This concept of game questions the idea of trial action without consequences (Bateson 2000; Dewey 1916). This aspect of the interrelation between games and rules has especially inspired Juul's work *Half-Real* (Juul 2005). Juul argues for an ambivalent status of the video game between "real" and "fictional," whereas the "real" is represented more or less through the system of rules. However, the variable functionality of rules is guaranteed by the fictional projections of video games. Juul's concept points to an important difference, which can be condensed by the term "magic circle."

The magic circle points back to Johan Huizinga's theory of games. For Huizinga, the magic circle describes the border within which a game is played as well as what is outside the context. This characterizes our current understanding of rules. His anthropological theory of "homo ludens" sees the game as a voluntary activity within certain boundaries of space and time following voluntarily accepted yet binding rules. Although his emphasis on the observation of rules in his definition of *game* was criticized, it has subsequently gained recognition as an important criterion for the definition of *game*. Rules not only confine competitive games in space and time but also determine the course and character of the game. Rules constitute the requirements for winning and the space of action. They limit the actions of the playing subjects, and they are set, fixed, and can be reproduced. Nevertheless, the supposedly mandatory necessity of rules is often in conflict with the element of contingency in games; the true cultural and philosophical value of games may lie in this dichotomy.

However, this strict separation leads to a problem because it upholds the difference between real and fictional (as mentioned by Juul); the rule seems to be part of both worlds. Rules are, on the one hand, part of the "real world," and, on the other hand, they help build the fictional worlds of video games. While playing a video game, we tend to recognize the obvious, constitutive rules. The invisible rules (e.g., "You have to do something or you will lose") are operative but exist outside the formal contours of the gaming technology. It is only by critically examining multiple layers of rules that one can understand how regimes of rules —as expanded systems of internal and external regulations—play with gamers just as they play with games.

Philosopher John R. Searle's classification of rules differentiates between *constitutive* and *regulative* rules. Constitutive rules are those that enable actions. In the case of the rules of video games, it at first appears that this type of rule is the most important. Without these rules, the game and its competition could not exist: if the ball hits the goal, you get a point. Constitutive rules are therefore negotiated, based on agreement, and overt in form. Regulative rules, on the other hand, are the sometimes ambiguous and explicit standards and agreements that structure intersubjective societal cooperation. They are closely connected to a society's common sense and for the most part appear to be invisible and naturalized.

One issue in video game debates regarding rules is whether games can be functionally defined based solely on regulative rules. Video games are unique because of the technical ability of programs and algorithms to enforce rules (both constitutive rules and regulative rules) automatically during gameplay. This also makes it appear that the rules of a video game cannot be broken by the player (apart from such things as cheat codes and hacking), especially in single-player games where there is no social contract between players. According to Huizinga, games thrive from the coexistence of obeying constitutive rules and the purposeful breaching of those rules. But the breach of constitutive rules does not lead to the end of the tacit agreement needed for the game; it can be part of the enjoyment of the game. In a way, cheat codes and walkthroughs seem constitutive of the gaming experience. However, breaches of the regulative rules lead to the sport being spoiled, so to speak. A good example may be the strategy of "camping" in multiplayer shooting games such as *Counter-Strike* (1999), a tactic in which a player obtains a strategic position somewhere on the map and waits for other players to arrive to kill them. It is a legitimate style of play but is often discussed in player communities as unsportsmanlike.

It is necessary, then, to at least differentiate between the regulative rules of the game itself that differ from the technological rules of the game. The latter are rules that are inscribed in the instrument itself as part of its workings and therefore do not appear as explicit instructions (such as the way the game engine simulates the laws of physics that are defined by the program code of the game engine). Thus, the rules represent at least a link between the game itself, the software application, and the hardware on which it runs. In video games, it does not seem possible to break the regulative rules and technological rules. Cheat codes and hacking may sometimes be partially breaking the technological rules, but in most cases of cheating (such as camping, the god mode, or full ammo patches), the possibilities of the cheat are intrinsic parts of the game codes themselves.

Because of the communication between players present in multiplayer games, constitutive rules can also be in effect in video games. In this case, the strict determination of the game's outcome by regulative rules and technically implicit rules would partially dissolve. The suggestion that the rules of video games leave no room for (intersubjective) negotiation and flexibility leads to the conceptualization of video games as a system of dominant rules. Although it is easy to focus on the regulative rules of video games, the presence of constitutive rules in multiplayer games reveals that the playing of such games involves more than simply the implicit technical rules of the game programming. Such things as game modifications, cheating, machinima, and so forth should be seen as places of negotiation regarding the constitutive rules of video games.

Rolf F. Nohr

See also: "Beating" a Game

Further Reading

Bateson, Gregory. "A Theory of Play and Fantasy." In *Steps to an Ecology of Mind: Collected Essays in Anthropology, Psychiatry, Evolution and Epistemology*, 177–193. Chicago: University of Chicago Press, 2000.

Consalvo, Mia. *Cheating: Gaining Advantage in Videogames*. Cambridge, MA: MIT Press, 2007.

Dewey, John. *Democracy and Education*. New York: Macmillan Company, 1916.

Huizinga, Johan. *Homo Ludens: A Study of the Play-Element in Culture*. Boston, MA: Beacon Press, 1955 [1938].

Juul, Jesper. *Half Real: Video Games between Real Rules and Fictional Worlds*. Cambridge, MA: MIT Press, 2005.

Salen, Katie, and Eric Zimmerman. *Rules of Play, Game Design Fundamentals*.

Cambridge, MA: MIT Press, 2003.

Searle, John R. *Speech Acts: An Essay in the Philosophy of Language*. Cambridge, MA: Cambridge University Press, 1969.

Russia

Soviet arcade games included slot machines and electromechanical arcade games such as *Morskoi Boi* (*Sea Battle*, 1981), *Tankodrom* (1981), *Rally-M* (1981), *Sniper* (1981), and *Safari* (1982). In *Sea Battle*, players shelled enemy ships; *Rally-M* was a racing game; and in *Sniper*, players shelled targets (see http://www.15kop.ru/en/). Such coin-operated gaming machines were usually installed in urban parks and cinema lobbies and were very popular among Soviet children and adults. From the late 1970s to the early 1990s, Soviet military factories produced some seventy different arcade games; however, "production of the games ceased with the collapse of communism, and as Nintendo consoles and PCs flooded the former Soviet states, the old arcade games were either destroyed or disappeared into warehouses and basements" (Zaitchik 2007).

In 1984–85, Alexéy Pazhitnov developed the first Russian video game, *Tetris*, which involved tetrominoes that fell and disappeared as players filled each row. The game soon became very popular not only in Russia but also abroad. *Tetris* was not copyrighted at first, allowing it to spread even faster than it would have otherwise.

In 1989, Nikita Skripkin created (for developer Locis) a very opportunistic computer game for the time, *Perestroika*, with a splash screen of Mikhail Gorbachev against the Kremlin wall. The game used the keyboard's arrow keys to send a frog "democrat" through the swamp, jumping from lily to lily while trying not to drown or be eaten by other frogs, the "bureaucrats." Lilies periodically reduced in size, disappearing and reappearing, and the speed increased with each level. At higher levels ("Milestones"), computer-controlled frogs appear, the "bureaucrats" trying to catch the player's frog "democrat." The round ends when the lily pad that the frog is sitting on disappears, or the frog jumps into the water, or it "eats" a bureaucrat. The game was a success with consumers.

The rapid development of the video game industry in Russia after 1990 contributed to the massive expansion of the internet in Russia. The early twenty-first century was a turning point for Russia in the intensive development of multiplayer browser video games on social platforms (such as Facebook), including *Mafia* (2006), *Virtual Russia* (2007), and *Soul* (2013), and it was also when Russia began to develop video games for mobile phones. Today, social video games are dominant in Russia; these games are created and distributed by companies such as Mail.ru Group, Crazy Panda, Plarium, and Social Quantum, which control 50 percent of the Russian market for video games (*Review of the Game Market* 2012, 18).

FOREIGN IMPORTS

By the 1990s, the Russian video game market was one of piracy, with many Western novelty games coming in illegally. In the twenty-first century, a significant percentage of the video game market is still imports (almost all well-known foreign video games, especially hits, can be found in the Russian market), while Russian manufacturers seek to fill the domestic market. In 2012, the Russian video game market reached USD 1.3 billion (almost one and a half times as much as in 2010), exceeding the income received from the Russian cinema box office, which was USD 1.2 billion for 2012. Despite all these achievements, the worldwide market share of video games for Russia is low, at only 2.2 percent (*Game Market in Russia* 2012, 4–6).

The growth in profit of the video game market in Russia is largely dependent on increasing the influence of online games (the market share of the online segment increased in 2012 by 64 percent to USD 900 million). In general, their volume has grown, over the period of 2010–12, to 2.4 times what is was before, while the market for off-line games dropped by about 12 percent (*Game Market in Russia* 2012, 4–6).

Significant increases occurred in the spread of video games in Russian social networks, and by the end of 2012, they reached a monthly audience of 52.6 million people. For example, playing video games occupies about one-third of social networks' daily audience (which is generally 9 million users). And the average social network users who play are willing to spend about USD 15 per month to pay for their online games (*Games Market in Russia* 2012, 7).

Massively multiplayer online games (MMOGs) are popular in Russia, particularly because they are free-to-play (F2P) games. In 2012, profit from casual games in Russia dropped significantly; however, these games are only 1 percent of the total Russian video game market.

RUSSIAN NATIONAL HISTORY AND VIDEO GAMES

During the 1970s and 1980s, games were too primitive for historical themes to develop. The Communist regimes did not suppress video game production, but before the 1990s, all Soviet video games were primitive. The Soviet regime did not buy Western video games to keep them from competing with domestic game products. The change came after the fall of the Communist regime, when technology allowed more complex plots and themes in games, including historical ones.

Despite the wide range of Russian history, game developers have mainly focused on military issues and battles of World War II (Belyantsev and Gerstein 2010, 282). However, there are exceptions. 1C Company released a military strategy game, *XIII Century: Rusich* (2008), in which the player takes on the role of the prince of Pskov. Chelyabinsk Regional Juvenile Library employees created a video game, *How the Urals Saved the Battle of Borodino* (2012), after the events of the War of 1812. The main characters of this video game, Ural teenagers, go to war in 1812 to fight the French. One of the most popular video games about Russian history is the strategy game *European Wars: Cossacks XVI–XVIII Centuries* (2001).

Russian school teachers of history have used video games to provide an interactive way to "survive" historical events to encourage secondary students' interest in history. The best games not only impart knowledge of history, geography, ethnography, and culture but also help students to understand the causes and consequences of certain events and learn about what life was like for people of various ages (Chernov et al. 2009, 46).

Russian strategy-based video games also examine recent history. For example, *The Truth about the Ninth Company* (2010) virtually reconstructs events of the war in Afghanistan in 1988, and *Confrontation: Peace Enforcement* (2008) opportunistically plays on the military events in Georgia and South Ossetia in August 2008, mixing history with fantasy (Russobit 2008). Unfortunately, the extensive use of historical video games reiterates the need for media education, which aims at raising the level of information literacy, media literacy, and media competence of people of all ages.

DOMESTIC VIDEO GAME PRODUCTION

One of the first video game companies in Russia in 1991 was Gamos, created by E. Sotnikov. Gamos released the logic-based video games *7 Colors* (1991) and *Color Lines* (1992) and is best known for *Sobor* (1991), *Sky Cat* (1991), *Columbus Discovery* (1992), *Balda* (1993), *Tank Destroyer* (1993), *Corners* (1993), *Kalah* (1993), *Magnetic Labyrinth* (1993), *Regatta* (1993), *Wild Snake* (1994), *Flip Flop* (1997), *Snake Battle* (1995), *Pilot Brothers: On the Trail of the Striped Elephant* (1998), and *Pilot Brothers: The Case of the Serial Maniac Sumo* (1998).

Gamos's main competitor was the Russian company Nikita (renamed Nikita Online in 2007), organized by Nikita Skripkin and Stepan Zotov in 1991. During 1992–97, the company released the educational video games *Wunderkind* (1995), *Happy Birthday* (1995), *Anatomik* (1996), *Journey through Europe* (1996), *Twigger* (1996), *Magic Dream* (1997), and *Parkan* (1997) and the arcade game *Hunter on the Road* (1997), among others. Nikita entered into agreements with Scandinavian countries to get data on the educational games used on three thousand computers at kindergartens and schools. Since 1999, Nikita has produced browser-based minigames and entered the German video game market. In 2002–3, Nikita, along with 1C Company, developed the first Russian multiplayer online game, *Sphere* (2004). In 2006, Nikita released three important projects for the Russian market; the browser-based game *WebRacing*, the economic strategy game *Truckers: Transport Company*, and, together with the television channel TNT, the online simulation game *House 3*, playing on the success of the reality TV show for youth (later, the project was called *Avatarika*). In 2012, Nikita Online relaunched the entertainment portal *GameXP* (www.gamexp.ru) with dozens of online games and social networking games. By 2013, there were ten million Nikita Online users, and the company had developed more than one hundred video games in a variety of genres.

In 1993, the distributor and video game producer Buka Entertainment was created and has since successfully distributed gaming consoles for SEGA, Nintendo, and Sony and created games that include *Russian Roulette* (1996), the quest *Petka and Vasily Ivanovich Save the Galaxy* (1998), *Education of Neznaika* (1999), *Magic Chest* (1999), and *Magic Game* (2012). Since 2000, the company has developed new video games for children under the name Bukashka and expanded its offerings with *Pacific Storm* (2004), *Metro: Last Light* (2013), and *Adventures of the Hunter* (2010) for the iPhone.

Another well-known Russian company, IT Territory, founded in 2004, publishes MMOGs (e.g., *Legend: Legacy of the Dragons* [2006]) and casual games, and in 2007, it became a part of the holding company Astrum Online Entertainment, along with Nival Online, Time Zero, and Nikita Online. Finally, the company Gameland is the leading publisher of game magazines, including *Land Games* and *PC Games*, and is the owner of the internet portal www.gameland.ru.

Without downplaying the role of the “old” Russian video game companies, it should be recognized that today Russia is dominated by relatively “new” companies for the development and creation of social online video games, such as Mail.ru Group (http://corp.mail.ru), Crazy Panda (http://crazypanda.ru), Plarium (http://www.plarium.ru), and Social Quantum (http://www.socialquantum.ru), that control 50 percent of the Russian video game market (*Review of the Game Market in Russia in 2011* 2012, 18). Mail.Ru Group is the most popular Russian free e-mail service, and as the operator of two leading Russian social networks, MoiMir@Mail.Ru and Classmates, it also owns a significant stake in the social network Vkontakte. Mail.RuGroup is actively engaged in browser-based video games (including games in social networks and mobile devices) and owns the rights to seventy online games in Russia, including the foreign *Perfect World* (2005), *The Lord of the Rings Online* (2007), and *Warface* (2013), and their own developments, such as *Legend: Legacy of the Dragons* (2006), *Allods Online* (2010), and more. Crazy Panda also develops social and mobile games, such as *Zaporozhye* (2011), and its online games have more than fifty million registered users. Among Plarium’s hits are the popular video games *Stormfall: Age of War* (2012), *War of Thrones* (2011), *MarketCity* (2013), and *Poker Shark* (2012).

VIDEO GAME PLAYERS IN RUSSIA

The average age of video game players among the urban population of Russia is thirty-three years (54% of them women and 46% men), 45 percent of them are married, and 58 percent have children (*Game Market in Russia* 2012, 13, 29), which proves that games are interesting to not only teenagers but also to adults. Furthermore, 87 percent of the Russian internet audience play video games more often than once a month, and 50 percent of them play every day. Due to the intense proliferation of tablet computers and smartphones, the number of Russian gamers playing games on these devices has increased to about 40–50 percent of the surveyed internet users. And about 60 percent of Russian internet users play video games online in cities with populations of more than one hundred thousand people. Most Russian players spend about 30 percent of their leisure time playing video games, both on weekdays and weekends. As much as 75 percent of Russian gamers are paying for video games, approximately 19 percent of their total spending on leisure, which also includes spending on restaurants and cafes (24%), sports (20%), and cinema (16%) (*Game Market in Russia* 2012, 24). According to Anisimova, 78.1 percent of video game players are thirty years old or younger, and 90.3 percent of them are male. Young men prefer games with three-dimensional graphics, role-playing games (RPGs), strategy games, and puzzle games, and young women prefer adventure games and card games (Anisimova 2004, 20). These studies proved that video games have aroused people's aggression, anger, addiction to the scenes of virtual violence, and emotional alienation (Anisimova 2004, 20), and they have become addictive (Lipkov 2008; Piljugin 2010). Similar phenomena were identified by my own study of underage gamers in Taganrog (Fedorov 2005).

There is an increase of interest in the virtual world not only by adults, university students, and grade school children but also by preschool children. In 2007, 80 percent of Russian preschool children said that they have a home computer; by 2008, this figure had increased to 92 percent, and by 2009, it had risen to 98 percent. The percentage who played computer games rose from 58 percent of preschool children in 2007 to 82 percent in 2008 and 94 percent in 2009. An even more rapidly growing number of children play computer games on their own, without the help of adults, from 28 percent in 2007 to 62 percent in 2009. The most popular games among preschoolers are various video game simulators that allow the player to control cars, planes, and helicopters, and boys are more passionate about these games. Simple puzzle games, arcade games, and games that require caring for virtual animals are played more by girls (Brevnova 2012, 20–21).

A sociological study of the urban population of Russia (with a sample of 2,033) showed that 87 percent of the urban internet audience plays video games more than once a month, and 50 percent play every day (*Game Market in Russia* 2012, 11, 20–21); however, countrywide, these figures are more modest, according to the research company GfK-Rus, who conducted a survey in 2010, in fifty-two regions, territories, and republics of the Russian Federation, with a sample of 2,205 respondents (including small towns and rural population, for whom internet access is often difficult). According to GfK-Rus, the number of Russians who play video games totaled 28.4 million people (i.e., not more than 24% of the adult respondents), 34 percent of which play video games each day, which is 16 percent less than in cities with a population of over one hundred thousand residents. The number of video gamers in rural areas (17.7%) is significantly lower than the urban average in Russia (Davydov and Nemudrova 2011, 110–111).

In general, the share of gamers among Russian men is 32.6 percent (including 12% who are active), and among women these figures are much lower (16.5% and 4.9%, respectively). The sixteen- to nineteen-year-old age group accounts for the peak gaming activity (62.1% of these, including 30.3% with a very high level of activity). Among Russians aged forty to forty-nine, 15.1 percent are active players in the video games (Davydov and Nemudrova 2011, 111). And though 45 percent of gamers in Russian cities (with a population of more than one hundred) are married (*Game Market in Russia* 2012, 13, 29), in general, only 19 percent of Russian married respondents play video games.

The typical domestic employment of video game players are school or university students (66.6%), employees with higher education (33.1%), or unemployed (31.5%), with the time spent by Russian gamers on video game at 126 minutes, on average (Davydov and Nemudrova 2011, 111). The largest subgroup, 34.2 percent of all Russian players, are so-called conservatives, for whom games are an insignificant part of their lives; their average age is 34.6 years, the majority are women (56.2%), and only 14.5 percent play video games daily. But gamers who are "fans" (9.1% of Russian video game players) are young men with a mean age of 25 years and average playing time of 195 minutes per day. Among Russian players, the most popular genre of games were puzzle games and jigsaw puzzles. They attracted 47.5 percent of respondents, whereas 30.8 percent prefer games like everyone else. Racing games were second most popular (41% of gamers' preferences), and shooting games were third (27.1%) (Davydov and Nemudrova 2011, 117).

Video games have become increasingly popular in Russia, and by 2013, video game sales exceeded that of film distribution for the first time. With the development and further expansion of the internet in Russia, we can expect significant increases in the online game market. And the increase in sales of high-definition televisions, smartphones, and tablets will increase sales of mobile games and cross-platform games.

Alexander Fedorov

See also: Europe (Central and Eastern)

Further Reading

Anisimova, I. V. *Features of Computer Culture of Students in Modern Russia: A Sociological Analysis*. PhD diss., Ekaterinburg, 2004.

Belyantsev, A. E., and I. Z. Gerstein. "The Image of the Country through a Computer Game: The Historical and Political Aspects." *Bulletin of the Nizhny Novgorod University*, no. 6 (2010): 279–283.

Brevnova, Y. A. *Computer Games in the Modern Subculture of Childhood (Socio-Cultural Aspects)*. PhD diss. Moscow, Russia, 2012.

Chernov, A. I., A. U. Morozov, P. A. Puchkov, and E. N. Abdullaev. *Computer Lessons for History and Social Science: A Guide for Teachers*. Moscow, Russia: Education, 2009.

Davydov, S.G., and T.A. Nemudrova. "The Experience of the Russian Audience Segmentation Gamers." *Sociology* no. 32 (2011): 104–123.

Fedorov, A.V. "School Students and Computer Games with Screen Violence: Russian Education and Society." *Russian Education & Society* 47, no. 11 (2005): 88–96.

Game Market in Russia: Final Report, 2012. Moscow, Russia: Mail.ruGroup, 2012.

Lipkov, A. I. *Pandora's Box: The Phenomenon of Computer Games in the World and in Russia*. Moscow, Russia: LKI, 2008.

Piljugin, A. E. "Dependence on Video Games as a Consequence of the Deficit Experienced by Adolescent Subjectivity." *Herald TSPU* no. 5 (2010): 115–118.

Review of the Game Market in Russia in 2011. Moscow: Mail.ruGroup, 2012.

Russobit, M. *Confrontation: Peace Enforcement*. 2008. Available at https://www.gamepressure.com/games/confrontation-peace-enforcement/zd230.

Savitskaya, T.E. "Computer Games: A Step to the Culture of the Future?" *Culture* *in the Modern World*, no. 4. Available at http://infoculture.rsl.ru.

Tkacheva, N. “Russian Users of Computer Games.” *Regular Research “Russian Target Group Index”—TGI-Russia* no. 1 (2006): 14.

Zaitchik, A. “Soviet-Era Arcade Games Crawl Out of Their Cold War Graves.” *Wired,* June 7, 2007. Available at http://www.wired.com/gaming/hardware/news/2007/06/soviet_games.

S

Santiago, Kellee (1979–)

Kellee Santiago is a Venezuelan American game designer and producer known for her work in independent games. Her interest is in games as a medium for evoking emotional responses, and she has been a leading figure in art games.

During undergraduate studies at the Tisch School of the Arts, Santiago was active in theatrical productions, where she regularly incorporated interactive digital media. She pursued a master's degree in interactive media from the University of Southern California, initially intending to remain in theater; however, after realizing that the reach of a student project (to which she had contributed) had exceeded the audience at every theatrical production, she became increasingly involved in game production. After graduating in 2006, she cofounded and served as president of Thatgamecompany.

At Thatgamecompany, Santiago contributed to the design and production of the company's early titles, including *flOw* (2007) and *Flower* (2009). *FlOw* was based on Jenova Chen's master's thesis project on the concept of dynamic difficulty adjustment and the concept of flow states. In *Flower*, which is considered a spiritual successor to *flOw*, the player is the wind, moving a flower petal through the air. These titles established Thatgamecompany as a leader among independent video game studios and met with critical acclaim. At the 2008 Game Developers Choice Awards, *flOw* was nominated for the Innovation and Best Debut awards and won the award for Best Downloadable Game. It received further nominations from the Academy of Interactive Arts & Sciences and the British Academy of Film and Television Arts. The Academy of Interactive Arts & Sciences also recognized *Flower* with multiple awards and named it Casual Game of the Year for 2009. In 2012, the Smithsonian American Art Museum included both *flOw* and *Flower* in its exhibit, *The Art of Video Games*.

After departing Thatgamecompany in 2012, Santiago took a role at OUYA as head of developer relations and content acquisition for the platform, where she worked until the company's sale and dissolution. Since 2016, she has worked on production and product development roles at Google, focused on the company's augmented reality (AR) and virtual reality (VR) game projects. She is also a founding partner of Indie Fund, an investment fund focused on independent game development projects, which launched in 2010. In 2011, *Fast Company* named her one of the one hundred most influential women in technology.

Jennifer deWinter and Carly A. Kocurek

See also: thatgamecompany

Further Reading

"Platform Deep Dive: Meet Kellee Santiago, Head of Developer Relations at Niantic." Niantic, October 30, 2019. Available at https://nianticlabs.com/blog/platform-deep-dive-kellee/.

Saturn. *See* SEGA Saturn

Saudi Arabia

Saudi players are considered among the most hardcore gamers in the Middle East; in a wealthy country where conservative culture controls most social activities, video games prove to be an affordable retreat for the young generation. The Saudi market is the biggest in the Middle East, with 4.5 million users and nearly USD 242 million in revenue in 2018. Yet, the rise of Saudi developers did not match such a surge in demand. The small number of talented developers could not upgrade their demos into full products, giving local investors a limited view of the capabilities of domestic talents, one that was shortsighted and overwhelmed by the consumption of entertainment products rather than the production of them. However, Semaphore Lab has proven to be an exception. This Saudi game development and animation studio was founded in 2010 by Ahmad Jadallah and released its first game, *Al Rekaz* (*Unearthed: Trail of Ibn Battuta*), in 2013, an adventure game with many similarities to Naughty Dog's *Uncharted* series but with local flavor. The company was praised, as it was the first local game supported on most platforms, including consoles, PC, and mobile. In 2016, the company released *Badiya: Desert Survival*, set during World War I, and its portfolio includes many different genres of games with local themes that are soon to be released.

During the rise of mobile games, a local company called Lumba, founded in 2013, introduced localized versions of games by Finnish company Supercell, including *Tribal Rivals* (2014), a direct reskin of *Clash of Clans* (2012), and *Tribal Mania* (2016), a reskin of *Clash Royal* (2016). Both games enjoyed reasonable success locally, with almost 6.5 million downloads of both games.

Radwan (RAD) Kasmiya

See also: Middle East

Further Reading

Lemon, Jason. "Saudi Arabia Bans 47 Popular Video Games Including 'Assassins Creed,' 'Deadpool,' and 'Final Fantasy.'" *Newsweek*, July 17, 2018. Available at https://www.newsweek.com/saudi-arabia-bans-47-popular-video-games-general-commission-audio-visual-1028013.

Semaphore Lab website. Available at https://www.semaphorelab.com/.

Save Function

The save function allows players to record their current progress and position in a video game to allow them to return to that point the next time they play. Save functionality did not exist in early arcade video games but became a common feature of video games in domestic spaces on home game consoles and personal computers. Arcade games have historically encouraged a shorter total playing time by requiring the player to insert a coin to initiate a game session and then generally limiting the player to a few opportunities, or "lives," for each such session; in a sense, a player "rents" an arcade game by inserting a coin. This design characteristic maximizes profitability of a given arcade unit by essentially forcing players to regularly insert more coins to continue play or start a new game. The economics of home console–based games did not require the game maker to encourage shorter playing times; because consoles and their games were sold outright, the length of playing time for a given game was no longer directly linked to its potential revenue. Thus, although arcade games continued to employ the same basic economic model, home games could encourage longer playing times, and save functionality emerged as a means to allow players to continue play from an earlier session to reduce player frustration.

The game dynamic in arcade games of multiple tries, or lives, per play session can be traced to mechanical coin-operated games such as pinball and Japanese pachinko machines. These mechanical precursors to electronic video arcade games gave the player a predetermined number of chances to play the game in exchange for the deposit of a coin, often supplying the player with a few metal balls. Using paddles and other methods of control, the player then manipulated and maneuvered these metal balls one at a time across an enclosed playing board. These games featured areas of the board that rewarded players with differing amounts of points for rolling the ball into particular regions of the board. Other areas removed the ball from the playing board and thus eliminated one of the player's "tries" on the board.

Much like these mechanical precursors, early arcade video games similarly required players to start the game from the beginning each time it was played and only allowed a player a few tries, or lives, per game session. Exidy's *Star Fire* (1979) introduced the high score table, which rewarded more skilled players by allowing those with the most points to record their initials or name on the game. This effectively encouraged players to challenge the scores of other players and generated more revenue in the process. Although *Star Fire* and subsequent titles allowed players to save high scores on the machine, arcade games have typically not allowed players to save and continue their progress within a game at a later point.

Because arcade game revenue depended on the number of times a game was played, arcade games often accentuated skill and speed and placed little emphasis on narrative development or world-building. In contrast, home games could develop narrative and the game's world in a more complex fashion, allowing for the emergence of longer-form game structures, such as those of adventure games. The longer amount of time required to successfully complete such home games encouraged a change in gameplay mechanics that allowed players to save their progress after each session of play rather than having to start from the beginning each time the game was played.

Whereas personal computers allowed game data to be saved to a floppy disk or hard drive, home consoles initially lacked the capacity to easily save such information. For example, Nintendo's *The Legend of Zelda* (1986), for the Nintendo Entertainment System (NES), was released on a specially designed cartridge that included a battery to store game data while the system was turned off. This allowed players to save their progress, accumulate possessions in the game, and resume the game later. Subsequent game consoles offered the ability to save games to memory cards (like the Sony PlayStation) or to hard drives built into the console (like the Microsoft Xbox). Online services such as Xbox Live and Nintendo Switch Online also allow for "cloud saving," wherein game save data is stored remotely on a server run by the service, allowing players to back up their saved game and restore it from the server, including to a different console or platform.

Early save game functionality in console and computer games was frequently cumbersome to access or use, requiring players to access a specific game menu to save. Some later games intentionally limited the number of times a game could be saved to make the game more challenging, such as Capcom's *Resident Evil* (1996; also named *Biohazard*). Other games simplified the saving process; for example, Valve's *Half-Life* (1998) had a "quick save" feature, allowing the player to press a single button to save the game. Save functionality has become a common feature of home video games, and games that use a save function often employ an "autosave" feature that will automatically save a player's progress at predetermined intervals or portions of the game, much like the similar use of checkpoints in games.

FromSoftware's action fantasy role-playing game (RPG) *Demon's Souls* (2009) combines autosaving with restricting the player's ability as a gameplay mechanic and to make the game considerably more difficult. The game uses a single game save slot and does not allow the player to manually save his or her progress. Instead, the game autosaves when a player completes a level in the game, permanently replacing the existing saved game. Players progress in the game by defeating enemies and collecting these enemies' "souls," which can be used to upgrade the player's character and items. If a player dies on a given level, all the souls collected since the last save are lost, and a "bloodstain" is left to mark the player's point of death on the level. The game then autosaves, and the player is sent back to the start of the level and must try to reach the bloodstain to reclaim the souls. If the player fails to do so and is defeated before reaching this bloodstain, the previously accumulated souls are permanently lost, and a new bloodstain and autosave are created. Therefore, the game employs autosaving to overwrite both player successes and failures, making the save function itself a key gameplay mechanic.

Christopher Hanson

See also: Game Design

Further Reading

Hanson, Christopher. "Saving and Restoring." In *Game Time: Understanding Temporality in Video Games*, 86–109. Bloomington: Indiana University Press,

2018.

Scepter of Goth

Scepter of Goth is a text-based adventure multiplayer game created by Alan E. Klietz that was launched in 1978 under the name *Milieu*. The game was renamed *Scepter of Goth* when it was ported on IBM XT in 1983. It is one of the first massively multiplayer online (MMO) games and was launched the same year as Richard Bartle's *MUD1*; since *Milieu* was originally a local game, it is difficult to know which came first. *Scepter of Goth* (*Milieu*) is the first commercial MMO, as *MUD1* was a free game.

Milieu was created by Klietz with the desire to make a multiplayer version of Crowther and Woods's *Adventure* (1977). It was the most popular game on the Minnesota Educational Computing Consortium (MECC). When MECC closed in 1983, the game was ported on IBM XT and renamed *Scepter of Goth*. Klietz then formed the company GāmBit Multi-Systems with new partners to support the new online system.

GāmBit was organized as a franchise system. Each franchise had paying customers (usually charged by the hour) and could support up to sixteen players connected via phone lines. GāmBit charged a franchise fee and took a part of the transaction done by the franchisees. Later, Interplay, one of the franchisees, bought GāmBit and supported the game until it went bankrupt in the late 1990s.

Scepter of Goth's combat and leveling mechanics were inspired by Dungeons & Dragons (D&D; 1974), especially the advanced edition. The character classes (cleric, fighter, lady [female only], magic user, paladin, ranger, thief, and the special classes assassin and barbarian) were also like D&D. The game had a player-versus-player (PvP) aspect, but it had mechanics to discourage powerful characters from killing lower-level characters.

To ensure the survival of the game and to create special, changing adventures, *Scepter of Goth* also used Dungeon Masters (DM). The DMs could, for example, create new monsters and rooms, interact with players, grant wishes to players, and even create new game worlds.

Most of the *Scepter of Goth* took place in a coastal city called Boldhome, which was surrounded by an ancient empire's ruins. The game also had other worlds, which were mostly created by DMs (e.g., one had a *Dragonlance* setting). The game's goal was to gain the Scepter. When a player gained it, a cataclysm destroyed the game's world, and the game would then restart.

Richard Bartle, in his book *MMOs from the Inside Out: The History, Design, Fun, and Art of Massively Multiplayer Online Role-Playing Games* (2015), says that many MMOG are directly influenced by *Milieu* and *Scepter of Goth* (e.g., *EverQuest* [1999], the *Guild Wars* series, and *Star Wars: The Old Republic* [2011]). He also notes that *Scepter of Goth* is often forgotten when people discuss the history of massively multiplayer online role-playing games (MMORPGs), even though the game had a strong influence on their development, and many game developers have been influenced by *Scepter of Goth* both as players and as DMs.

Laura Iseut Lafrance St-Martin

See also: Online Games

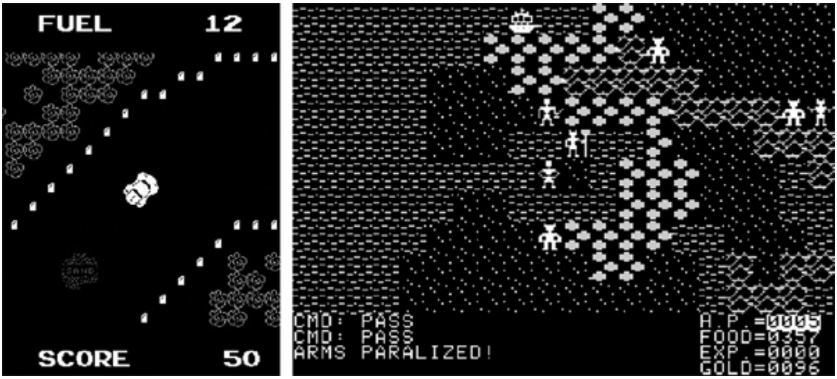
Further Reading

Alberti, B. *Scepter of Goth History*. 2010. Available at https://fr.scribd.com/document/205379306/Scepter-of-Goth-history.

Wheeler, D. A. “Scepter of Goth.” 2012. Available at https://dwheeler.com/scepter-of-goth/scepter-of-goth.html.

Scrolling

Scrolling was important to the development of video games because it meant that screen edges no longer had to be the boundaries where a game’s playing field ended; spaces could continue off-screen and be brought on-screen through the process of scrolling, making the discovery of the playing field a part of the game.



The first video game to feature scrolling was Kee Games’s arcade game *Super Bug* (1977) [left]. The first home computer game with scrolling was Origin’s *Ultima* (1980) [right]. (Courtesy of Mark J. P. Wolf)

The patent for scrolling (United States Patent #4,445,114, “Apparatus for Scrolling a Video Display”) was filed by Atari on October 3, 1980, and listed David R. Stubben as the inventor. Scrolling had appeared a few years before, first in *Super Bug* (1977) by Kee Games (a subsidiary of Atari), which featured four-way scrolling (horizontally and vertically), and two-way scrolling appeared in Atari’s *Football* (1978), the graphics of which provided the example used in the patent. The first home computer game to feature scrolling was Richard Garriott’s *Ultima* (1980), which used a tile-based system: a new row or column of tiles was added as the screen scrolled from one position to the next.

Eight-way scrolling involves a background that can scroll horizontally and vertically at the same time, so the player character can move northwest, northeast, southwest, and southeast, in addition to the north, south, east, and west movement found in four-way scrolling. Games with eight-way scrolling include the arcade game *Aztarac* (1983) and home console game *Mega Man 3* (1990). Other variations on scrolling continue to appear. For example, in Jason Rohrer's *Passage* (2007), as space scrolls by horizontally, it does not move on-screen and off-screen at the screen's edges but rather compresses or decompresses horizontally on either end, so all the horizontal space is represented on-screen at all times, albeit sometimes in highly compressed form.

Although originally patented for use in video games, scrolling became a common element of the graphic user interface (GUI) of home computers during the late 1980s, with on-screen scroll bars to control the scrolling. Scrolling is now common enough that hardware is designed with it in mind, and computer mice now often feature a wheel that allows the user to scroll the screen directly from the mouse itself. On touchscreen devices such as the iPhone and iPad, scrolling is accomplished simply by flicking the screen with one's finger, an intuitive gesture that seems to move the screen's image manually. New patents that involve scrolling continue to appear, for example, patent #5,877,760, "User Interface for Synchronously and Independently Scrolling Windows" (filed 1996), and patent #7,428,709, "Multiple-Panel Scrolling" (filed 2005).

Mark J. P. Wolf

See also: Graphics

Further Reading

United States Patent #5,877,760. "User Interface for Synchronously and Independently Scrolling Windows." Accessed September 24, 2020. Available at http://www.freepatentsonline.com/5877760.pdf.

United States Patent #4,445,114. "Apparatus for Scrolling a Video Display." Accessed September 24, 2020. Available at http://www.freepatentsonline.com/4445114.pdf.

United States Patent #7,428,709. "Multiple-Panel Scrolling." Accessed September 24, 2020. Available at http://www.freepatentsonline.com/7428709.pdf.

SEGA

The company that would become SEGA began in the 1940s. Martin Bromley, with partners James Humpert and Irving Bromberg, started Standard Games in Honolulu. Bromley managed several game rooms on the U.S. Territory of Hawaii that featured slot machines, pinball games, and various other coin-operated amusement appliances.

In 1951, when new gambling legislation was passed, the company purchased confiscated slot machines from the government and shipped them overseas for use by servicemen stationed in Japan. At this time, Bromley decided to move the company to Tokyo. In May 1952, he partnered with American businessmen Dick Stewart and Ray Lemaire and began importing musical jukeboxes; they renamed the company Service Games of Japan, or the Japanese equivalent, Nippon Koraku Bussan. The company became one of the three largest coin-op companies in Japan, competing with Taito and Rosen Enterprises Ltd., with mechanical devices placed in more than five thousand locations on the Japanese islands.

During this same period, Dave Rosen, operating under the name of Rosen Enterprises Ltd., was importing art and other items, such as coin-operated instant photo booths, into Japan. Although very successful, Photorama technology was not patented, and other competitive franchises began to sour the market. Rosen began looking for an alternative luxury product to import. In 1956, Rosen began importing electromechanical games (such as *Deluxe Baseball* [1953]), primarily manufactured stateside by Midway and Williams, which became very popular. In time, arcade parlors began to emerge in Japan.

By the mid-1960s, a large portion of the electromechanical games that were being manufactured were very similar to, or improved updates of, other available games. Rosen recognized that more diversity was needed within the industry, and in 1965, Rosen Enterprises Ltd. merged with Service Games to create SEGA Enterprises Ltd. The combination of the first two letters of each word in the company's name—"SE" from "Service" and "GA" from "Games"—created the name "SEGA," which is now known as one of the pioneers of the video game industry.

The new company's focus was to create original games to be placed in its established locales. Within five years, SEGA was creating approximately ten new games a year and even exporting them to the United States. SEGA's first release was *Rifleman* (1967), a target-shooting game that featured a rifle mounted to a cabinet. SEGA's first hit was *Periscope* (1968), a submarine simulator that featured a periscope apparatus that allowed the player to aim and fire torpedoes at targets.

In 1969, the oil giant Gulf + Western acquired SEGA Enterprises, and the SEGA brand became part of the Paramount group, with Rosen remaining CEO of the SEGA division. With new backing, which included a new infusion of cash, SEGA began to grow even larger and faster. SEGA then gained control of Gremlin, a proven American arcade company that had a highly regarded manufacturing division. The Gremlin acquisition allowed SEGA to become a major supplier of games across the United States and Europe. By 1979, SEGA had released more than a hundred electromechanical games, including *Jet Rocket* (1970), a flight simulator regarded by many as one of the finest electromechanical games ever designed.

In the early 1980s, SEGA made the transition into the electronic gaming industry. Examples of early SEGA coin-op video games are the raster-based titles *Astro Blaster* (1981), *Space Odyssey* (1981), and *005* (1981). SEGA also released five vector games, *Eliminator* (1981), *Space Fury* (1981), *Star Trek* (1982), *Tac/Scan* (1982), and *Zektor* (1982). SEGA began to license, produce, and publish games for home consoles such as the Atari VCS 2600. SEGA arcade titles, such as *Buck Rogers* (1982), *Congo Bongo* (1983), and *Star Trek* (1982), were all released for the Atari 2600. Several SEGA brand games, including *Carnival* (1980), *Turbo* (1981), and *Zaxxon* (1982), were also released for the Mattel Intellivision, the ColecoVision and other home video game systems and home computers.

In 1982, SEGA's revenues reached $214 million. As a pioneer in technology, SEGA released several groundbreaking titles, such as *SubRoc-3D* (1982), the first coin-op game with 3-D hardware that delivered a separate image to each eye, creating a stereoscopic effect. SEGA also released the game *Astron Belt* (1982), the first developed arcade laserdisc game.

In July 1983, SEGA entered into the home video game console market in Japan with the release of the SG-1000. Releasing mostly scaled-down ports of SEGA's arcade games, the SG-1000 was a modest success, and the slightly modified SG-1000 Mark II was subsequently released. SEGA also released the SC-3000 series of home computers in Japan.

During the video game industry crash of 1983, Gulf + Western split SEGA and sold it to two groups: The U.S. commodities were sold to pinball manufacturer Bally, and the Japanese assets were sold for $38 million to Dave Rosen; Hayao Nakayama, the Japanese head of operations; and multibillion-dollar Japanese conglomerate CSK chairman Isao Ohkawa. This new company structure placed Nakayama as company president and Ohkawa as chairman; Rosen took control of the new American division. In 1984, Japanese giant CSK purchased SEGA.

In Japan, a new SEGA system, the SG-1000 Mark III, was released in 1985. That same year, Nintendo successfully launched the Nintendo Entertainment System (NES), filling the void left empty by Atari in North America, Europe, and Australia. SEGA recognized the opportunity and moved into the console market in the United States for the first time. As a result, the SG-1000 Mark III was renamed the SEGA Master System (SMS) and launched in the United States in 1986 via a distribution deal with Tonka Toys. The SMS reached European shores the following year. By 1986, SEGA stock was being traded on the Tokyo Stock Exchange. Hit titles, which later became SEGA franchises, were born, including *Shinobi* (1987), *Phantasy Star* (1988), and *Alex Kidd* (1986); the main character of the latter, Alex Kidd, became the unofficial SEGA mascot.

SEGA released the SEGA Mega Drive in Japan in 1988 and in the United States in 1989, with the name changed to the SEGA Genesis, due to a trademark dispute. SEGA initially negotiated with Atari to market the console in the United States, but, failing to come to agreeable terms, successfully released the Genesis in North America itself, packaged with a copy of the popular arcade game *Altered Beast* (1988). The initial marketing campaign against rival and market share leader Nintendo involved personality licensing. SEGA positioned itself against the competition with the likes of Evander Holyfield, Michael Jackson, Tommy Lasorda, Joe Montana, Pat Riley, and other well-known sports figures and celebrities. It also launched the successful "Genesis Does What Nintendon't" campaign.

SEGA also chose to challenge the Nintendo Game Boy portable handheld game system. In 1990, the SEGA Game Gear handheld console was released in Japan; most other regions saw a release the following year. Unlike the Game Boy, it had a color screen. The Game Gear was very similar in design to SEGA's own Master System home console. As a result, many SMS games were converted for play on the Game Gear, and a device called the Master Gear Converter allowed for actual Master System cartridges to be played on the Game Gear. Although more successful than other handheld competitors of the time, such as the Atari Lynx or NEC's TurboExpress, the Game Gear still failed to capture the market from Nintendo's Game Boy.

Nintendo had Mario to market its brand, and SEGA needed a similar mascot because Alex Kidd and other SEGA franchises could not compete. Realizing that Nintendo's initial demographic was aging, in 1991, SEGA created Sonic the Hedgehog, a new character aimed at the teenage market, and a game with Sonic was bundled with the new system. Within a year, Sonic the Hedgehog became so popular that he was the first and only non-Disney character at Disney theme parks. SEGA started screaming its brand name at the end of every advertisement, and the "SEGA Scream" was born.

SEGA reached its peak in the early 1990s. The arcade market was profitable, and *Sonic the Hedgehog 2* (1992) on the SEGA Genesis sold more than six million copies. In North America, SEGA controlled 65 percent of the video game market (GamertechTV 2010). In 1992, SEGA introduced new peripherals for the SEGA Genesis, the CD-ROM-based Mega CD, also known as the SEGA CD, which paired an additional CPU with a CD-ROM drive. With the SEGA CD, the Genesis could play full-motion video (FMV), perform scale and rotation effects to sprites, provide a larger color palette, play CD-quality audio and CD + G-enhanced audio CDs, and store massive amounts of data compared to cartridges. SEGA touted its technology advancement with its "Welcome to the Next Level" campaign.

But the introduction of the SEGA CD split SEGA's user base, brand focus, and resources. At $300, the SEGA CD was relatively expensive, and most developers at the time were unprepared and ill-equipped to deal with the new technology. As a result, few developers took advantage of the second CPU and mainly just ported previously existing software with minor upgrades, such as improved audio or inserted FMV cutscenes, most of which failed to improve gameplay.

In 1994, SEGA launched the SEGA Channel, a cable television network. Subscribers were supplied with an adapter that fit into the SEGA Genesis cartridge slot by their local cable company. This adapter allowed users access to fifty games, some unique to the service, and was unavailable in retail outlets. At one time, the SEGA Channel had a quarter million pay subscribers.

Also in 1994, the SEGA Saturn was released in Japan, and its release in the United States was planned for Saturday, September 2, 1995, dubbed "Saturnday." However, that date was a ruse, and the SEGA Saturn was actually launched on May 11, 1995, for $400. The announcement occurred during the Electronic Entertainment Expo (E3), to the surprise of the industry, including up-and-coming competitor Sony. It was so much of a surprise that many retailers, such as Walmart and KB Toys, were left out of the early launch. Angered by this exclusion, many vendors refused to carry the system. Game publishers were also caught off guard by the revelation, and, as a result, little software was available for the Saturn release. Despite having a four-month lead over the Sony PlayStation, the Saturn only sold eighty thousand consoles before Sony's release date. The PlayStation sold one hundred thousand consoles at launch, partially because of its cheaper price point, which was a full hundred dollars less than the Saturn.

Although the Saturn was just as powerful as Sony's machine, it was more difficult for developers to program with because it had two separate central processing units (CPUs) and six other processors. The initial design for the system only had one CPU, but when SEGA learned of Sony's PlayStation specifications, it added a second processor to try to leapfrog the competition technologically. In the end, the move to make a better console resulted in lower-quality software and longer development times, leading to delays. As a result, Sony became the market leader as the Saturn slowly lost ground.

Following the heyday of the Genesis, patrons began to lose confidence in the SEGA brand. Although the last three generations of SEGA platforms (SEGA CD, 32 X, and Saturn) were not exactly failures, they were not as successful, by any means, as SEGA or consumers had hoped. In late 1998, SEGA launched its final hardware platform, the SEGA Dreamcast, which was the first console to include a built-in modem supporting online play, including voice chat. When the Dreamcast launched in the United States on September 9, 1999 (9/9/99), it sold more systems in twenty-four hours than any game platform in history, with a staggering 225,132 units sold. Within two weeks, it more than doubled that number to over a half million units, a milestone for the time, making it the most successful hardware launch in history.

The Dreamcast held its own for two years until Sony launched the Sony PlayStation 2 in the winter of 2000. Although SEGA continued to support the Dreamcast until 2002, it announced that it was leaving the hardware industry and becoming a third-party software publisher. To date, SEGA brand games are available for most gaming platforms, including the Microsoft Xbox One, the Nintendo Switch, and the Sony PlayStation 4.

Michael Thomasson

See also: Generations of Technology

Further Reading

Birch, Aaron. "SEGA Ages." *Retro Gamer* 5 (2004): 28–34.

GamertechTV. "SEGA through the Ages, the History of SEGA." December 6, 2010. Available at http://www.gamertechtv.com/2010/sega-through-the-ages-the-history-of-sega (site discontinued).

SEGA CD/Mega-CD

The SEGA CD was an add-on peripheral that allowed CD media software to play on a standard SEGA Genesis cartridge-based console. It premiered in Japan as the Mega-CD in December 1991, connecting to the Japanese Genesis equivalent, the SEGA Mega Drive. It was originally designed to compete with the NEC PC-Engine (named the Turbografx-16 in the United States) CD unit, a popular platform in Japan. However, after reaching the market, its primary competition became the Super Nintendo Entertainment System (SNES), especially in the Western Hemisphere.

The SEGA CD was released in the United States beginning in late October and early November 1992. Priced at $299.99, the SEGA CD unit was more expensive than the SEGA Genesis unit itself. SEGA sold all 50,000 SEGA CD units produced in the first run within three weeks, selling out just before the Thanksgiving holiday. The second run of 150,000 units was released just in time for Christmas on December 22. To put this in perspective, the Japanese Mega CD sold about 100,000 units in its first year; the U.S. release had doubled the Japanese sales in a quarter of the time. The initial success of the SEGA CD in the United States looked promising for SEGA and its CD-based device.

The advantages gained by connecting the SEGA CD unit to the SEGA Genesis were many. Graphically, it allowed the Genesis to perform such computations as ultrasmooth scaling and biaxial rotation of sprites using an ASIC graphics processor. It also made interactive movies possible by allowing the Genesis to run full-motion video (FMV). Greatly improved audio was also an obvious benefit of compact disc (CD) media.

CD-ROMs could also hold much more data than the traditional cartridges of the time. Most cartridge games were 1 to 4 megabytes in size, whereas a SEGA CD-ROM could hold more than 650 Mb of game data. Expanded memory space meant more features and game improvements. Memory in the early 1990s was very expensive, so CD-ROM manufacturing, even though it was relatively new to the industry, was substantially cheaper than manufacturing a cartridge.

The technology behind the SEGA CD consisted of its own central processing unit (CPU), the Motorola 68000. This CPU ran parallel with the SEGA Genesis 68000 CPU, combining both CPUs to perform functions. It doubled the Genesis system memory and enabled larger color palettes (128 using hold and modify [HAM] techniques or 256 colors for FMV content) to be used above the regular Genesis 64 color palette.

Two models were released over the SEGA CD's life span. The initial model released in November 1992 featured a front-loading door and was mounted below the Genesis unit, connected via the interface slot located on the right of the console. A second model was released in 1994 for $230. This unit was designed to connect to the second Genesis console that was smaller in size and positioned itself to the right of the Genesis unit. This model also replaced the front-loading interface with a manually opened door.

Other devices that would play SEGA CD games included the JVC X'Eye (WonderMega in Japan) and SEGA's own CDX, both of which were stand-alone units that played SEGA Genesis and SEGA CD software. Pioneer released the LaserActive platform, which was modular in design and allowed SEGA software to play on the device with the insertion of a SEGA Module. This module also allowed special laserdisc games to be played using the SEGA hardware. Perhaps the most unusual and rare of the SEGA CD units is the Aiwa CSD-G1M Mega Drive boom box, which was only released in Japan. This portable stereo had a radio and could play audio CDs and cassette tapes in addition to Mega Drive and Mega CD video games.

The SEGA CD came bundled with the FMV title *Sherlock Holmes Consulting Detective*, a space shooter called *Sol-Feace* (1992), a compilation disc with four classic SEGA titles (*Columns*, *Golden Axe*, *Shinobi*, and *Streets of Rage*) and two CD + G music sampler discs. The short-lived CD + G format, short for CD + Graphics, was a format that played graphic images while playing music from the CD, similar to the traditional slideshow.

The SEGA CD had support from many third-party developers and publishers, including such proven companies as Data East, Konami, Vic Tokai, and Working Designs. Even Sony Imagesoft and Psygnosis, supporters that later became SEGA's rivals in the industry, created content for the SEGA CD. Two publishers, Digital Pictures and Midway, thrust the SEGA CD into the limelight unwittingly. Unfortunately, the publicity was negative and affected sales of the SEGA CD to some degree. Violence in gaming had become controversial since the release of Exidy's *Death Race* (1976), but with the advent of FMV gaming, a new level of realism had entered into the industry. Digital Pictures revived an old project originally created for Hasbro's unreleased Project NEMO for the SEGA CD under the name *Night Trap* (1992). Because the game had some questionable material, it became one of the centerpieces of a congressional investigation concerning violence in video games. Paired with the negative press concerning Midway's *Mortal Kombat* (1992), also available for the SEGA CD, the hearings that began on December 9, 1993, scared parents just at the height of the Christmas shopping season.

Night Trap was not the only FMV title released for the SEGA CD. In fact, the SEGA CD became known as the system for FMV games. Digital Pictures also resurrected another old NEMO game, *Sewer Shark* (1992), and created new FMV content. Many companies believed FMV to be the future of gaming and invested heavily in the new technology. SEGA was so involved that it created its own movie studios to create FMV gaming content. The market behaved differently, and after poor reviews of FMV-style games by trade and consumer magazines, followed by poor sales, the fanfare quietly died, taking the SEGA CD along with it.

Production of the unit was suspended in December 1995. After four years on the market, the SEGA CD sold 2.5 million units in the United States and approximately 6 million units in total worldwide. Because the Genesis sold approximately 29 million consoles, it is evident that about 20 percent of Genesis/Mega Drive owners chose to upgrade their Genesis consoles with a SEGA or Mega CD. More than 150 games were released for the SEGA CD platform. *Shadowrun* (1996) was the final official game released for the Mega CD, until Good Deal Games revived publishing on the SEGA CD platform in December 2000.

Michael Thomasson

See also: SEGA

Further Reading

Machkovech, Sam. "28 years Later, a No-Disc Version of the Sega CD Exists—And It Rocks." *Ars Technica*, March 29, 2020. Available at https://arstechnica.com/gaming/2020/03/28-years-later-a-no-disc-version-of-the-sega-cd-finally-exists-and-it-works/.

SEGA Dreamcast

The SEGA Dreamcast was a sixth-generation 128-bit home video game console. It was released on October 27, 1998, in Japan; on September 9, 1999, in North America; and on October 14, 1999, in Europe. A last-ditch effort to reinvent the company image and distance itself from the earlier string of failures—specifically, the abandoned SEGA Genesis add-ons, SEGA CD and 32X, and the poorly selling SEGA Saturn—the system was SEGA's final foray into the home console market.

The Dreamcast featured a Hitachi SH-4 CPU, operating at 200 MHz. Its NEC PowerVR2 128-bit graphics chip offered a peak rendering rate of three million polygons per second, maximum resolution of 640-by-480 pixels, 24-bit color, and hardware support for alpha blending, perspective correction, anisotropic, bilinear and trilinear mip mapping, Gouraud shading, bump mapping, z-buffering, and anti-aliasing. The system had 16 MB of main memory, 8 MB of video memory, and 2 MB of sound memory. The Yamaha AICA Sound Processor provided sixty-four sound channels, with 3-D sound support. Software was distributed on GD-ROMs, SEGA's proprietary high-density optical discs, with a capacity of 1.2 GB. The Dreamcast was the first console to provide out-of-the-box online connectivity with a built-in modem (which was later superseded by a broadband adapter).

The system received a wide variety of peripherals, including a mouse and a keyboard, as well as a number of specialized controllers, such as a fishing rod controller (supported by several fishing games), motion-sensitive maracas (for use with *Samba de Amigo* [2000]), and a dual analog joystick (bundled with *Cyber Troopers Virtual-On: Oratorio Tangram* [1999]).

Of note was the Visual Memory Unit (VMU). Essentially a 128 KB memory card, it also featured a small 48-by-32 monochromatic LCD display, a speaker, a directional pad, and four buttons. A number of Dreamcast titles included minigames that could be downloaded into the unit, which could then be used as a simple handheld game console.

SEGA allocated a $500 million budget for the development and marketing of the console; in an effort to not repeat the mistakes made with the Saturn; approximately half of that sum was directed toward the promotion of the new system. In Japan, after a strong launch, sales dropped off quickly, especially after the announcement of the Sony PlayStation 2 (PS2). In the wake of PS2's release, the system was largely ignored. The Dreamcast's U.S. debut, however, was a spectacular success. With more than 225,000 units sold within the first twenty-four hours, it was considered the most successful launch in video game history.

But SEGA was not able to sustain the initial momentum. Its track record of prematurely discontinuing support for its consoles fostered wait-and-see attitudes among buyers and third-party developers alike (e.g., Electronic Arts [EA]—a major contributor behind the success of the SEGA Genesis—declined to support the platform at all). Other contributing factors included SEGA's continued reliance on arcade ports and underutilized online connectivity (although the SEGANet service was operational since launch day, the software was delayed, and the slow speed of the built-in modem was also a problem). Finally, Sony's strong brand name and the hype surrounding the PS2 also served to divert attention away from SEGA's console. Interest in the Dreamcast waned despite price cuts, and in mid-2000, SEGA dropped the system's price to $149; shortly thereafter, it offered a $150 mail-in rebate with two-year SEGANet subscriptions. Sales spiked but did not substantially increase the system's market share.

With the discontinuation of the Dreamcast in 2001, SEGA withdrew from the home console market and shifted to third-party game development. Independent games for the Dreamcast are developed to this day. Notable Dreamcast games include *Soulcalibur* (1999), *Shenmue* (1999), *Samba de Amigo*, *Phantasy Star Online* (2000), *Rez* (2001), and *Ikaruga* (2002).

An interesting outgrowth of the Dreamcast technology was the SEGA NAOMI (New Arcade Operation Machine Idea) arcade system board. Unveiled in 1998, this low-cost alternative to expensive arcade platforms was effectively a Dreamcast with expanded main memory and video memory. Hardware similarities made conversion between the two platforms simple, with popular titles ported to Dreamcast after a successful arcade run. In 2000, the NAOMI board was succeeded by the NAOMI 2 board.

P. Konrad Budziszewski

See also: SEGA

Further Reading

McFerran, Damien. "Retroinspection: SEGA Dreamcast." *Retro Gamer* 50 (2008): 66–77.

Pettus, Sam. "Death of the Dream." *Eidolon's Inn*. Available at https://web.archive.org/web/20080619165703/http://www.eidolons-inn.net/tiki-index.php?page=SegaBase+Dreamcast.

SEGA Game Gear

The SEGA Game Gear, released in Japan in 1990, was Sega's first portable console. With its 32-color backlit LCD screen, 8-bit Z-80A processor, and the ability to output stereo sound through headphones, the Game Gear sought to upstage rival portables on the basis of its technical specifications. The Game Gear's primary competition was the Nintendo Game Boy, a console that, despite its ostensibly "withered" (or "seasoned") specifications (see Reynolds 2016), had established something of a monopoly in the burgeoning market for handheld games. The Game Gear's software catalog largely consisted of ports of games originally developed for SEGA's Master System home console, including *Sonic the Hedgehog* (1991) and *Land of Illusion Starring Mickey Mouse* (1993).

Although it had a commercial life that lasted until at least the year 2000 (SEGA officially withdrew support for the console in 1996), and although it purportedly sold nearly eleven million units worldwide, the Game Gear was (and still is) regarded as a "failure" by many magazines (Sato 1998) and websites (Buchanan 2008). Like most portable consoles from the past two decades (including, e.g., the Atari Lynx, the NEC TurboExpress, and the Sony PlayStation Portable [PSP]), the Game Gear was unable to meaningfully challenge Nintendo's long-standing dominance in the portable video game market (as opposed to the mobile video game market [see McCrea 2011]).

The Game Gear is nonetheless a console that poses problems for "Wikipedic" accounts of video game history. It fulfilled almost every expectation that could be had of a handheld console in the early 1990s, yet it was unable to dislodge the

Game Boy. “If you’re thinking about a hand-held system,” wrote the editors of *SEGA Visions* in 1991, “Game Gear should be your hands-down choice. Game Gear has a big 3.2” screen, color that will knock your eyes out, and graphics and animation that will stand up to your home video game system” (Ninsen and Harris 1991, 4). The Game Gear’s “failure” is often attributed to its hardware design (specifically, its short battery life) and its limited software catalog. Yet, as media historians have long noted, perceived hardware and software shortcomings are rarely determining factors when it comes to the success or failure of any given technology (much as price is rarely a determining factor; see Lipartito 2003, 59). Success and failure are better understood as social constructions—shared values, expectations, aspirations, and apprehensions—that come to be assigned to particular technologies in any given cultural period or context (see Marsden 1988; Vermeir 2006; Boyer 2009; Arsenault 2017). “Alter any number of circumstances,” writes Kenneth Lipartito (2003, 76), “and failure might have been a success”—such a statement rings true for the Game Gear.

The Game Gear was explicitly developed and marketed to appeal to long-standing *fantasies* in video game culture; namely, the fantasy of a full-color backlit portable device capable of adequately reproducing venerated titles such as *Sonic the Hedgehog* in handheld form. Despite not selling as many units as Nintendo’s Game Boy, it still performed important narrative work for game history by preparing ground for the various full-color portable consoles that came after its release.

Like many technologies released in the 1990s, the Game Gear suffers from “capacitor plague,” meaning that its capacitors are prone to leaking, bursting, or generally becoming weaker over time, which can compromise (or completely debilitate) the console’s sound output and display. However, fans have created numerous online how-to guides for replacing the console’s capacitors, ensuring that the Game Gear continues to enjoy a commercial afterlife. The console has inspired various homebrew projects, such as the recently released *Swabby* (2016) from Hang-On, a game that remediates assets, sprites, and backgrounds from Game Gear titles such as *Sonic the Hedgehog* and *Shinobi* (1991).

Benjamin Nicoll

See also: SEGA

Further Reading

Arsenault, Dominic. *Super Power, Spoony Bards, and Silverware: The Super Nintendo Entertainment System*. Cambridge, MA: MIT Press, 2017.

Boyer, S. “A Virtual Failure: Evaluating the Success of Nintendo’s Virtual Boy.” *The Velvet Light Trap* 64 (Fall 2009): 23–33.

Buchanan, L. “Remember Game Gear?” IGN, October 9, 2008. Available at https://au.ign.com/articles/2008/10/09/remember-game-gear.

Lipartito, K. “Picturephone and the Information Age: The Social Meaning of Failure.” *Technology and Culture* 44, no. 1 (2003): 50–81.

Marsden, B. “Blowing Hot and Cold: Reports and Retorts on the Status of Air-Engine as Success or Failure, 1830–1855.” *History of Science* 36 (1988): 373–

420.

McCrea, C. “We Play in Public: The Nature and Context of Portable Gaming Systems.” *Convergence: The International Journal of Research into New Media Technologies* 17, no. 4 (2011): 389–403.

Nicoll, B. *Minor Platforms in Videogame History*. Amsterdam, Netherlands: Amsterdam University Press, 2019.

Ninsen, A., and B. Harris. “A Letter from the Publishers.” *SEGA Visions* (April/May 1991). Available at https://archive.org/details/Sega_Visions_Volume_01_Issue_04_1991-04_Sega_US/page/n5.

Reynolds, Daniel, “The Virtuvian Thumb: Embodied Branding and Lateral Thinking with the Nintendo Game Boy.” *Game Studies* 16, no. 1 (2016). Available at http://gamestudies.org/1601/articles/reynolds.

Sato, H. “The History of Sega Console Hardware.” *Famitsu*, November (1998). Available at http://shmuplations.com/segahistory/.

Vermeir, K. “The Reality of Failure: On the Interpretation of Success and Failure in (the History and Philosophy of) Science and Technology.” In *Variantology 2: On Deep Time Relations of Arts, Sciences and Technologies*, edited by S. Zielinski and D. Link, 335–358. Köln, Germany: Walther König, 2006.

SEGA Genesis/SEGA Mega Drive

The SEGA Mega Drive was a fourth-generation video game console. It was released in Japan on October 29, 1988; in North America (as SEGA Genesis) on August 14, 1989; and in Europe on November 30, 1990.

16-BIT
SEGA
MEGA DRIVE SEGA

The SEGA Genesis, also known as the SEGA Mega Drive. (Robtek/Dreamstime.com)

Positioned as a direct competitor to the Nintendo Entertainment System (NES) and NEC PC-Engine/TurboGrafx-16 and marketed as the first "true" 16-bit console (a jab at the latter's hybrid 8/16-bit architecture), the Genesis/Mega Drive was SEGA's attempt to bring arcade-quality games to a home system. The hardware design was based on the company's successful System-16 arcade board. The similarities between the two platforms allowed for easy conversion of existing arcade titles, giving the system access to a considerable library of popular, recognizable games.

The system was based on a 16/32-bit Motorola 68000 CPU, operating at 7.67 MHz, and was equipped with 64 KB of main memory, 64 KB of video memory, 8 KB of secondary memory, and 8 KB of sound memory. The Zilog Z80 chip served as the primary sound controller (providing up to ten sound channels) and provided backward compatibility with the SEGA Master System (SMS). The dedicated video display processor (VDP) could display graphics in up to 64 colors from a 512-color palette, at the maximum resolution of 320-by-224 pixels. Games were distributed on cartridges.

Although it was not very successful in Japan, the system became a great hit in the United States and Europe, where it was marketed as an "edgy" and "cool" alternative for older consumers. Under the "Genesis Does What Nintendon't" slogan, the American advertising campaign emphasized the software library aimed at a more mature audience, including numerous arcade-quality games as well as sports games endorsed by popular athletes (e.g., *Tommy Lasorda Baseball* [1989] and *Joe Montana Football* [1991]).

It was not until the 1991 release of *Sonic the Hedgehog*, however, that the system finally received its "killer app" (an application that consumers buy a system to obtain). The fast-paced platform game was SEGA's response to Nintendo's *Mario* series, its eponymous character designed to provide the company with an instantly recognizable corporate mascot. *Sonic* proved highly popular and soon replaced the arcade port *Altered Beast* as the system's pack-in title. This move, in combination with intensified advertising efforts, led to an exponential increase in sales. By 1992, SEGA held a 55 percent share of the U.S. 16-bit market. The console enjoyed similar popularity in Europe; in Japan, however, it remained at a distant third place behind the Super Nintendo Entertainment System (SNES) and the PC-Engine.

The Genesis/Mega Drive received a number of accessories, most notably the Power Base Converter (an adapter for SEGA Master System cartridges), the SEGA CD/Mega CD add-on, and the 32X expansion unit. Initially conceived as an entirely new platform, the 32X was eventually adapted into an expansion pack intended to fend off competition from the SNES and extend the market life of the system until the SEGA Saturn gained sufficient momentum. Equipped with two 32-bit RISC processors, a more powerful VDP, and an additional 512 KB of memory, the unit added support for three-dimensional graphics and increased the number of on-screen colors to 32,768. However, developers quickly abandoned the 32X in favor of the Saturn. Only about forty games were released, many of them enhanced ports of existing titles. Despite price drops, the expansion was a commercial failure. It was discontinued along with the SEGA CD in 1995.

In addition to SEGA's original Genesis/Mega Drive and the slightly revised Genesis 2/Mega Drive 2, the system was also available in a wide variety of variants and derivations, manufactured by SEGA or its licensees (including, e.g., the SEGA Multi-Mega/CDX, the handheld SEGA Nomad, Majesco's Genesis 3, the JVC Wondermega/X'eye, and the Amstrad Mega PC).

The Genesis/Mega Drive was discontinued following SEGA of Japan's decision to focus attention on the SEGA Saturn. The system was supported in Europe and Brazil until 1998. With approximately thirty million units sold worldwide, it was the second-best-selling console of the fourth generation (following the SNES) and SEGA's most popular home system.

P. Konrad Budziszewski

See also: SEGA

Further Reading

McFerran, Damien. "Retroinspection: SEGA 32X." *Retro Gamer* 77 (2010): 44–49.

Pettus, Sam. "Genesis: A New Beginning." SEGA–16.com, July 7, 2004. Available at http://sega–16.com/feature_page.php?id = 61 (site discontinued).

Pettus, Sam. "Project Mars: Anatomy of Failure." SEGA–16.com, July 7, 2004. Available at http://sega–16.com/feature_page.php?id = 56 (site discontinued).

"Retro Gamer Celebrates the Mega Drive." *Retro Gamer* 62 (2009): 26–35.

Szczepaniak, John. "Retroinspection: SEGA Mega Drive." *Retro Gamer* 27 (2006): 42–47.

SEGA Master System/SEGA Mark III

The SEGA Master System (SMS) premiered in Japan as the SEGA Mark III in 1985. The machine was only intended for the Japanese market, until Nintendo successfully launched the Nintendo Entertainment System (NES) in North America. Seeing the success of the NES overseas, SEGA decided to compete, and in June 1986, the SMS debuted in the United States with a $200 price point.

Games for the Master System were available in two formats. The traditional media for console gaming at the time was the cartridge, and that was also the primary software delivery format for the SMS. A typical SMS cartridge could hold up to 4194 KB of memory. However, cartridges were expensive to manufacture, so for simpler titles that required less data, a cheaper alternative was available. This format, which could hold a maximum of 256 KB, was referred to as a "SEGA Card" because it resembled the approximate size and shape of a credit card.

Although the Master System had the usual lot of accessories, such as a sports pad roller controller, light phaser, and alternative controllers, SEGA also issued the SEGAScope 3-D Glasses, which were very high quality and offered quite an immersive experience for the six games that were compatible with the device. It was far superior to the anaglyphic 3-D system that used red and blue filtered lenses commonly used for 3-D movie viewing since the 1950s (see 3-D Hardware). The SEGAScope 3-D accessory actually used a shutter system synced to the graphics presented on the television screen.

One Master System strength was the ports of popular SEGA arcade titles, such as *After Burner* (1988), *Hang On* (1986), *Shinobi* (1988), and *Space Harrier* (1986). SEGA's unofficial mascot of the time was Alex Kidd, which appeared in four separate games for the SMS, before making the transition to the SEGA Genesis and being retired and replaced with Sonic the Hedgehog. The Master System also launched one of SEGA's most beloved franchises by releasing *Phantasy Star* in 1988. The *Phantasy Star* series has since spawned more than a dozen games and continues to receive new iterations almost annually.

A SEGA Master System II was also released. This console was not an entirely new system but a cosmetically redesigned SMS created to lower the unit cost and allow the system to be marketed for a longer period of time. The SMS II's compatibility with cartridge media was excellent, but the new hardware lacked the ability to play the SEGA Card software (which was rarely used) as well as other minor changes and omissions.

The SMS was unable to compete against the NES in the United States. Nintendo's dominance was roughly 90 percent of the video game industry, with only 10 percent remaining for the SMS and the Atari 7800 to share. There are many possible reasons why the Master System failed to compete in the United States. Distribution and marketing were initially done by Tonka; although this move was originally done to help the Master System reach the public, it is possible that it actually hindered its availability and hurt retail sales. In 1990, SEGA of America reacquired the SMS rights, but promoting the Master System became less of a priority for SEGA with the new SEGA Genesis console on the market, which was performing strongly.

Lack of third-party support certainly harmed the Master System. Nintendo had exclusive contracts with most software developers at the time, which prevented them from making software for rival companies, including SEGA. Because many of these contracts were signed before the Master System even hit the market, and because the SMS had such a small market share, few third parties even took notice. A console is only as good as its software; with the SMS library paling in comparison to the massive Nintendo library, it was definitely debilitating.

Although the Master System did not fare well in the United States, it was more successful in other markets, such as Europe, Australia, and Brazil. The United States only received a fraction of the games for the SMS; domestically, 114 titles were released, whereas an additional 232 games were released overseas. Thus, less than half of the 346 available games were released in the United States.

When SEGA retired the SMS in 1992, the hardware and some games lived on. The Power Base Converter was a device that allowed SMS games to be played on its bigger brother, the SEGA Genesis. The legacy continued when SEGA released its first portable system, the SEGA Game Gear. The Game Gear was basically a portable SMS with minor enhancements, and the Master Gear peripheral allowed Master System games to be played on a Game Gear.

Although the SEGA Master System never reached its full potential, it did pave the road for SEGA to infiltrate the market and transition from a software company making software for other home hardware manufacturers to a consumer electronics hardware company. The Master System certainly taught SEGA many lessons that proved fruitful when launching its next hardware platform, the SEGA Genesis, which became its most successful console.

Michael Thomasson

See also: SEGA

Further Reading

Weiss, Brett. *Classic Home Video Games: 1985–1988*. Jefferson, NC: McFarland & Co., 2009.

SEGA Mega Drive. *See* SEGA Genesis/SEGA Mega Drive

SEGA Saturn

The SEGA Saturn was a fifth-generation 32-bit home video game console. Released on November 22, 1994, in Japan; on May 11, 1995, in North America; and on July 8, 1995, in Europe, the system was SEGA's attempt at securing an early hold on the emerging 32-bit market and regaining an advantage over Nintendo.

Originally envisioned as a two-dimensional-oriented machine with secondary three-dimensional capabilities, the Saturn was radically redesigned in response to the announcement of the Sony PlayStation. The system was built around two Hitachi SuperH-2 32-bit RISC processors, operating at the speed of 28.63 MHz. Its dual custom video display processor chips could render up to five hundred thousand polygons per second, at the maximum resolution of 704-by-480 pixels, and could simultaneously display thirty-two thousand colors from a 24-bit color palette. The Saturn Custom Sound Processor, controlled by a Motorola 68CE000 chip, provided up to thirty-two channels of PCM playback (CD-quality sound) and up to eight channels of FM synthesis. The Saturn had 2 MB of main memory, 1.5 MB of video memory, and 512 KB of sound memory and was equipped with a double-speed CD-ROM drive. The system's complex architecture, with two CPUs and six other processors, made it notoriously difficult to program, especially as the twin processors did not operate in parallel but rather competed for memory access.

The Japanese launch was a success, with approximately 170,000 units sold on the first day alone. However, the North American release date was rescheduled from September to May to gain market advantage over the coming PlayStation. Rushed to the market, with its early surprise release date, the Saturn received virtually no promotion. To make matters worse, few games were available at launch because many third-party titles, developed with the original timeframe in mind, were still unfinished. The relatively strong initial sales tapered off quickly. By the time of PlayStation's September 9 launch, the Saturn had only sold around 80,000 units—a number Sony's console easily surpassed within the first week.

Launched at $399, the system cost $100 more than the PlayStation. The complex hardware made cost-saving revisions difficult; as a result, the Saturn's price was not lowered in pace with those of the competing 32-bit systems. In addition, the game offerings were perceived to be out of touch with the market. Playing to its perceived strength, SEGA continued to rely heavily on arcade ports rather than console-specific titles. Moreover, the reluctance of the company's American branch to release role-playing games (RPGs) and games with two-dimensional graphics ensured that many of the most successful Japanese titles never made it to the United States. SEGA's ailing reputation, heavily undermined by the SEGA CD and 32X fiascos (see **SEGA Genesis/SEGA Mega Drive**), and Sony's aggressive promotion of the PlayStation also contributed to the Saturn's weak market performance. Throughout its life, the system remained at a distant third place behind the PlayStation and the Nintendo 64.

The announcement of the SEGA Dreamcast at the 1997 Electronic Entertainment Expo was widely received as the Saturn's death knell. Hardware and software sales dropped sharply. As a consequence, a number of third-party titles, planned or already in development, were canceled, further contributing to the system's decline. The Saturn was discontinued in the United States in 1998; in Japan, a stronger customer base kept it alive until 2000. Notable Saturn releases include *NiGHTS: Into Dreams . . .* (1996), *Shining Force III* (1997, 1998), *Guardian Heroes* (1996), *Virtua Fighter 1* and *2* (both 1995), *Virtua Cop 1* (1995) and *2* (1996), the *Panzer Dragoon* series (1995–98), *Radiant Silvergun* (1998), and other 2-D shooting games as well as a number of two-dimensional fighting games.

P. Konrad Budziszewski

See also: SEGA

Further Reading

Pettus, Sam. "Kamikaze Console: Saturn and the Fall of SEGA." *Eidolon's Inn*, January 10, 2008. Available at http://www.segacd.org/segabase/SegaBase_SaturnPart2.html.

"Retroinspection: SEGA Saturn." *Retro Gamer* 34 (2007): 44–53.

Serious Games

A *serious game* is a game that has been designed for a reason other than to just entertain. The term has been applied to game development in fields such as business, education, medicine, science, and the military. The term itself has been credited as far back as 1970 to Clark Abt, who wrote a book called *Serious Games*. There were no commercial video games in 1970, but Abt used the book to argue for games that were not intended primarily as amusement but had specific educational goals.

The term regained prominence in 2002 when the Woodrow Wilson Center for International Scholars created the Serious Games Initiative. Shortly thereafter, the term was picked up by multiple authors. For instance, Zyga (2005) defined a *video game* as "a mental contest, played with a computer according to certain rules for amusement, recreation, or winning a stake" (25). He differentiated a serious game as the same mental contest, but one that used the entertainment to further specific objectives (such as health, education, or communication).

There is not one clear definition of serious games. As authors attempt to further define *serious games*, they often end up creating new terms based on the context of use. For instance, *advergaming, edutainment,* and *exergaming* refer to the use of games beyond simple entertainment in the respective fields of advertising, education, and health and wellness. *Gamification* refers to the notion of applying game mechanics to nongame settings for the purpose of improving outcomes. *Smart gaming* can be defined as the use of higher-order thinking and strategies, both individually and in multiplayer games, to achieve game objectives. *Social impact gaming* is the use of games to achieve a desired social change.

Given this variation in definitions, there is also great variability and argumentation as to when serious games first appeared. Arguably, serious game development began in earnest in the mid-2000s, timed with the rise in popularity of both the ideas and the terms. One example of a serious game is *Darfur Is Dying* (2006); in the game, participants must find ways to keep their refugee camps running. Along the way, they learn about the genocide in Darfur and ways to help humanitarian efforts. A second example is *Re-Mission* (2006), a game that teaches people about cancer. Researchers (Kato et al. 2008) found that playing *Re-Mission* increased adolescent and young adult treatment adherence, self-efficacy, and knowledge about cancer. A final example is *Superbetter* (2012), a game developed in response to Jane McGonical suffering depression and suicidal thoughts after having a concussion. The product is an attempt to help people overcome challenges.

Recent research has provided evidence for the importance of serious games in learning and teaching about topics ranging from social skills to behavior change (Boyle et al. 2016). For instance, there is recent evidence that the use of serious games stimulates brain activity. De Freitas described one study in which game players had whole-brain activity compared with formal learning in which only limited brain activity occurred. “Other studies are showing how mirror neurons (premotor neurons) fire both when a person acts and when that person observes the action performed by someone else. In this way, the neuron mirrors behavior as though it were doing the action itself, which might help to explain why simulation and imitation with an emphasis upon visual data are such powerful learning tools” (De Freitas 2009, 26).

Richard E. Ferdig

See also: Education (General)

Further Reading

Abt, Clark. *Serious Games*. New York: Viking Press, 1970.

Boyle E. A., T. Hainey, T. M. Connolly, G. Gray, J. Earp, M. Ott, T. Lim, M. Ninaus, C. Ribeiro, and J. Pereira. “An Update to the Systematic Literature Review of Empirical Evidence of the Impacts and Outcomes of Computer Games and Serious Games.” *Computers & Education* 94 (March 1, 2016): 178–192.

De Freitas, S. “Serious Games.” *Adults Learning* 20, no. 7 (2009): 26–27.

Derryberry, A. “Serious Games: Online Games for Learning.” 2007. Available at https://iktmangud.files.wordpress.com/2014/09/online-games-for-learning.pdf.

Kato, P. M., S. W. Cole, A. S. Bradlyn, and B. H. Pollock. “A Video Game Improves Behavioral Outcomes in Adolescents and Young Adults with Cancer: A Randomized Trial.” *Pediatrics* 122 (2008): 305–317.

Sawyer, B., and P. Smith. “Serious Games Taxonomy.” Presentation at the Serious Games Summit at the Game Developers Conference 2008. Available at https://thedigitalentertainmentalliance.files.wordpress.com/2011/08/serious-games-taxonomy.pdf.

Serious Games Initiative website. Available at https://www.wilsoncenter.org/program/serious-games-initiative.

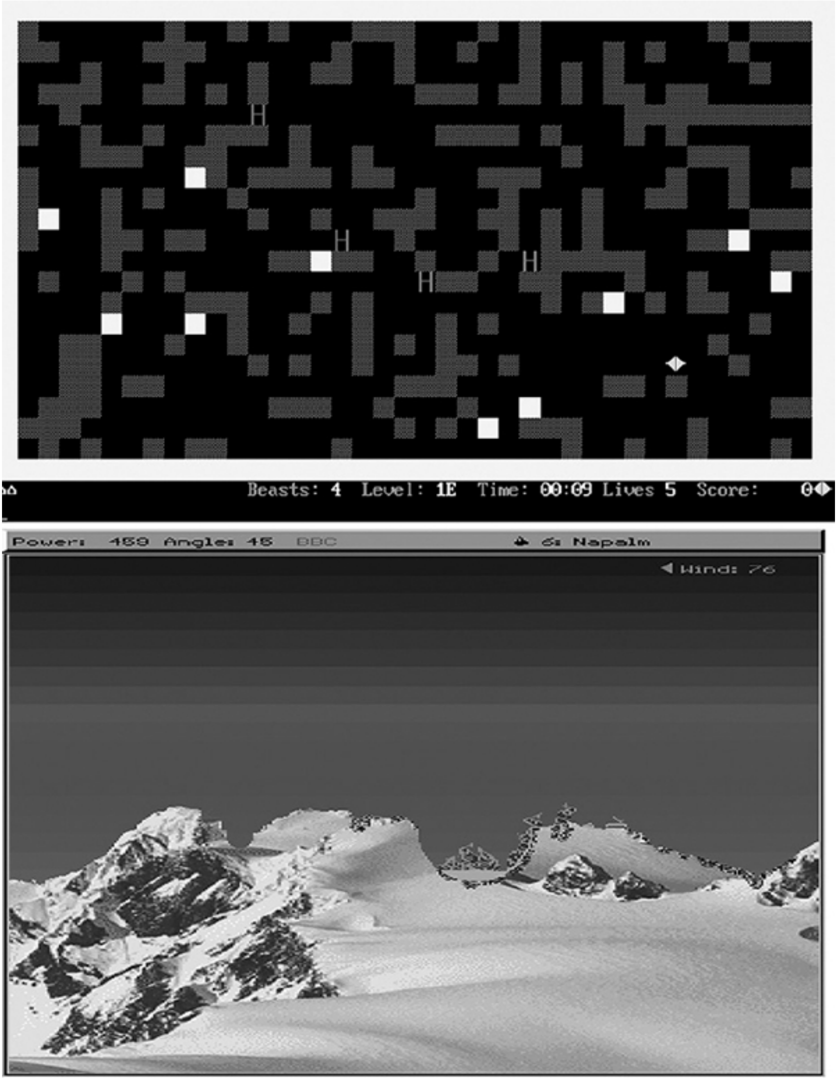
Susi, T., M. Johannesson, and P. Backlund. *Serious Games—An Overview* (Technical report: HIS-IKI-TR-07-001), University of Skövde, Sweden, 2007. Available at https://www.diva-portal.org/smash/get/diva2:2416/FULLTEXT01.pdf.

Zyga, M. “From Visual Simulation to Virtual Reality to Games.” *Computer* 38, no. 9 (2005): 25–32.

7800. *See* Atari 7800 ProSystem

Shareware Games

With the widespread arrival in the early 1980s of personal computers—the IBM PC, Apple II, Commodore 64, and others—home computer games became a burgeoning commercial industry. It was an acutely entrepreneurial period, and many hobbyist programmers were curious about selling their games or showcasing them in an effort to land a full-time job in the new industry. Several groundbreaking games of the period that we know as commercial titles actually began as amateur efforts, including *Rogue* (1980), *Lode Runner* (1983), and the *Zork* series (1977–80). Along the road from amateur to professional came a new pit stop known as *shareware*, a distribution method that encouraged players to pay through a mixture of community goodwill and “try before you buy” up-sell advertising. With an air of the communal camaraderie that characterized early software development in the university time-sharing labs of the 1960s and 1970s, shareware attracted hobbyist developers ambivalent toward the business of professional software and distribution. Shareware developers sought commercial compensation for their work, but for the vast majority, these proceeds would not be (nor were they intended to be) a primary source of income.



Above: *Beast* (1984), a surprisingly fluid action game, given its ASCII text-based graphics. Below: The turn-based tank game *Scorched Earth* (1991-1995) is best known for its "hot-seat" two-player mode. (Courtesy of Mark J. P. Wolf)

Shareware distribution entails the release of two variants of a program: the *free* (or *demo*) version, which is available without payment and encourages its own copying and redistribution by users, primarily relying on word-of-mouth marketing, and the *registered* (or *paid*) version, which usually improves upon the free with additional features or documentation. Shareware's free distributions often exhort the user to register for the *full* version by sending payment directly to the author. In the pre–World Wide Web of the 1980s and early 1990s, most shareware (both games and more general applications) could be registered for anywhere between $5 and $50, a fee commonly delivered as a check or even cash via postal mail. Diskettes, a game manual, or a registration code for the full program were delivered in return. Shareware up-sell “marketing” ranged from amateur salesmanship promising more advanced capabilities, to appeals to the user’s desire to contribute to a community of grassroots software development, to outright pleas for compensation. Shareware’s cousin, *freeware*, indicates that the full version of the program is available without a registration fee, and payment, although often requested for goodwill, is even more discretionary. Shareware and freeware are often discussed together, but freeware retains a greater association with hobbyists, whereas shareware is considered entrepreneurial. The shareware concept is generally attributed to a trio of developers, each of whom created important early business programs: Jim Knopf’s database software *PC-File* (1982); Andrew Fluegelman’s *PC-Talk* (1982), a networking program for using dial-up modems; and Bob Wallace’s *PC-Write* (1983), a word processor. Despite its office software roots, however, PC game programmers quickly took up the form and began releasing shareware and freeware in the mid-1980s.

David Clark’s *Sopwith* (1984) for the IBM PC is illustrative of shareware’s tenuous commercial status. Clark was a programmer at BMB Compuscience, a Canadian database and networking company, when he wrote the popular World War I–themed game that was influential in establishing the side-scrolling aviation subgenre. He included a multiplayer mode alongside the four-color CGA graphics to demonstrate BMB’s just developed PC networking technology, Imaginet. Although for-profit, BMB was not a game company, however, and *Sopwith* was given away for free to promote Imaginet at trade shows. Decades later, the game has maintained a devoted following—Clark released a definitive “author’s edition” in 2000—whereas the proprietary Imaginet is an obscurity known only from the history of the game. *Sopwith* is a lesson in the difficulty of technological prediction, and the influence of programmers’ personal interests on the products of their employers.

An early freeware highlight is *Beast* (1984), developed by Dan Baker, Alan Brown, Mark Hamilton, and Derrick Shadel, an elegantly simple action game in which the player manipulates a dense playing field of green blocks, pushing and pulling apart walls in an effort to crush the enemy “beasts” between them. Using the technique of ASCII *text graphics* established by *Rogue* and others, *Beast* achieves a level of animated fluidity that is unexpectedly effective for an early PC with limited graphics hardware. *Beast*’s title screen reads, “This is a free copy of BEAST. You may copy it and give it away. If you enjoy the game, please send a contribution ($20) to Dan Baker.” Another example is Wendell Hicken’s turn-based tank fighter *Scorched Earth* (1991), one of the best-loved PC shareware games of all time; it is particularly well known for its “hot-seat” multiplayer mode, in which players alternate turns in front of a single computer. Like many popular shareware and freeware titles, *Scorched Earth* succeeds by limiting its ambitions, catering to the particular (and often restrictive) capabilities of the early PC, opting for a stripped-down graphical style: a single-screen, side-view mountain range done up in a handful of bright, saturated colors.

Without an established retail infrastructure, shareware relied on informal trading and distribution through word-of-mouth networks, both digital and social.

For PC shareware and freeware, the predominant distribution channel was the dial-up modem bulletin board system (BBS). These pre-Web communities were typically hosted on individual home computers, which other modem-equipped PCs could network with by dialing in over a standard phone line. This reliance on the landline phone network made most BBSs local in scale, although some did achieve regional or national reach via long-distance calls. As the name indicates, BBSs began as sites for discussion, providing a semipublic forum in which users could share knowledge and software. Because they were usually hobbyist projects themselves, the BBS phenomenon provided a natural affinity with shareware and freeware games. In addition to acting as way stations for the trading of game files, many BBSs also hosted their own games. BBS *door games* (so-called because of the manner in which the BBS host software ran additional programs "on the side") such as *Solar Realms Elite* (1990) and *Trade Wars 2002* (1986) pioneered multiplayer networked play long before other platforms.

In the 1980s, most shareware was created and distributed by individual programmers at home, on evenings and weekends, or on borrowed time from work or school. Registration fees were a friendly way for players (themselves sometimes hobbyist developers) to support each other, even if modestly. By the early 1990s, however, shareware had spawned its own big business wing, with enterprising companies that assisted with payment collection (adding conveniences such as toll-free ordering by phone), large-scale floppy diskette duplication, and postal exchange. The two most prominent of these full-service shareware publishers were Apogee Software and Epic MegaGames. Initially each company simply extended the reach of its founders' own games: Scott Miller of Apogee's *Kingdom of Kroz* (1987) and Tim Sweeney of Epic's *ZZT* (1991). But as they began ramping up their publishing operations, Apogee and Epic established a regimented distribution framework far more organized than those of solo developers. Apogee released popular side-scrolling platform games, including *Duke Nukem* (1991), developed in-house, and *Commander Keen* (1990) from Id Software, an up-and-coming shareware developer founded by four friends from Texas and a client of Apogee's distribution services that would go on to create the blockbusters *DOOM* (1993) and *Quake* (1996). Epic countered with the *Jill of the Jungle* series in 1992.

But one game published by Apogee in May 1992 changed shareware—and the entire game industry—forever. *Wolfenstein 3D*, Id Software's World War II–themed, Nazi-hunting, verging-on-camp breakthrough that single-handedly popularized modern three-dimensional gaming and helped establish the first-person shooter (FPS) genre that has been a staple ever since. With the shareware model thrust into the limelight by *Wolfenstein 3D* and its successor *DOOM*, 1994 was a bumper year; Epic released a string of home console–style action titles: *Jazz Jackrabbit*, by Dutch graphics programmer Arjan Brussee, made PC side scrollers respectable, and *One Must Fall: 2097* did the same for 2-D fighting games. Apogee followed a similar tack with the vertical shoot-'em-up (or "shmup") *Raptor: Call of the Shadows*.

Tellingly, these games were predominantly published—rather than developed—by Epic and Apogee. That such middlemen companies could not only support themselves but indeed thrive through the shareware model signaled a continuing loss of meaningful distinction between shareware and the mainstream commercial games industry. These publishers themselves drifted from their shareware associations and became fully integrated into the larger industry. Apogee changed its brand name to 3D Realms in 1996 and subsequently developed the successful *Max Payne* series (2001–3), and Epic is responsible for the *Unreal* series (1998–present) and 3-D technology engine. As home internet access rapidly increased in the mid-1990s, commercial game companies began offering extensive demos of upcoming or newly released games, a free source of entertainment that drew attention and viability away from the remaining shareware developers who had not already gone to larger distribution houses. By the final years of the decade, the shareware model had fallen from favor.

The shareware era of the 1980s and 1990s was neither the beginning nor the end of games produced and distributed by individuals. Strains of the shareware method have reemerged in recent years, with the establishment of the indie gaming community on PCs and the internet and the prevalence of the "free demo" and "try before you buy" model on Apple's App Store for the iPhone. Yet, although *shareware* originated as a descriptive term that defined a distribution and business model, it has become an associative one, attached to the specific cultural and historical situation of 1980s and 1990s home computing. For many curious users, shareware and freeware were their first chance to find and play video games—commercial or otherwise—on the new personal computers, and the form was a significant (and often underappreciated) force in the growth and "mainstreaming" of game development, playing habits, and culture.

Brett Camper

See also: Free-to-Play Model

Further Reading

Camper, Brett. "Shareware Games." In *The Video Game Explosion: A History from PONG to PlayStation and Beyond*, edited by Mark J. P. Wolf, 151–157. Westport, CT: Greenwood Press, 2007.

Shaw, Carol (1955–)

Carol Shaw is an early video game designer known for her work at both Atari and Activision. She started early, first programming in BASIC in a high school math class, then pursuing studies at UC Berkeley in electrical engineering and computer science at the undergraduate level, including a master's in computer science.

Shaw joined Atari in 1978 as a microprocessor software engineer and immediately designed two games for the Atari 2600: a Polo game for Ralph Lauren Polo cologne and *3-D Tic-Tac-Toe* (1978). Although *Polo* was initially not released, the Strong National Museum of Play credits this game as the first documented game designed and programmed by a woman. *Polo* was eventually released in the 1996 CD-ROM compilation *Stella Gets a New Brain*.

Shaw continued her work at Atari, including *Othello* (1978), codesigned with Ed Logg; *Video Checkers* (1980); and *Super Breakout* (1981), codesigned with Nick

Taylor. She also cowrote the *Atari BASIC Reference Manual* (1980) with Keith Brewster. In addition to being a designer and programmer, Shaw, like many designers working at the time, did her own graphic design. In an interview, Shaw explained, “Nobody had developed any sort of thing to do [graphics] on the computer, so you’d just draw your thing on graph paper and then hand code it into the right hex values. I guess I would hand write my code [on paper] and then type it in and because we didn’t have screen editors that would edit the text at that point, we just had line editors—those fairly tedious things” (qtd. in Edwards 2011). At Atari, Shaw was known among her peers as a gifted programmer, particularly for her work on kernels for a number of 2600 games for which she was not the credited designer.

Shaw left Atari in 1980 for a stint at Tandem Computers before joining Activision in 1982. Activision’s founders had left Atari largely over frustration that developers did not benefit financially from their successful games, and so at the time, Activision had a very different structure for credit and royalties. Shaw’s first game at Activision, *River Raid* (1982) for the Atari 2600, is probably her most commercially successful and best-known title. Later, she worked on ports of *River Raid* for other systems and designed and programmed the game *Happy Trails* (1983) for the Mattel Intellivision. She then returned to Tandem in 1984 and stayed there for the rest of her professional career. Shaw retired early in 1990, a decision she says the financial success of *River Raid* enabled.

In 2017, the Game Awards recognized Shaw with the Industry Icon Award.

Jennifer deWinter and Carly A. Kocurek

See also: Activision; Atari

Further Reading

Edwards, Benj. “VC&G Interview: Carol Shaw, Atari’s First Female Video Game Developer.” *Vintage Computing,* October 12, 2011. Available at http://www.vintagecomputing.com/index.php/archives/800/vcg-interview-carol-shaw-female-video-game-pioneer-2.

Fleming, Jeffrey. “The History of Activision.” Gamasutra, July 30, 2007. Available at https://www.gamasutra.com/view/feature/129961/the_history_of_activision.php.

Shin Nihon Kikaku. *See* SNK (Shin Nihon Kikaku) Playmore

Shooting Games

One of the most common types of video games, shooting games, often colloquially called “shooters,” are games in which the main objective of the game involves shooting, the act of which usually requires either aiming, timing, or both, sometimes repeatedly in quick succession. Shooting games can further be defined by the player’s point of view or perspective, the avatar’s movement restrictions, ammunition restrictions, whether opponents can return fire, what you are shooting at, and how the shooting occurs. As shooting games evolve, additional features and considerations continue to be added.

THE PLAYER'S PERSPECTIVE

Shooting games are most commonly categorized by the player's perspective of the game's action, which is typically either a third-person perspective or a first-person perspective. Earlier games were typically third-person perspective because a first-person perspective requires a three-dimensional setting that needs more computational power to achieve.

A player in Japan playing *Police 911*, an arcade game in which players use a light gun. (Courtesy of gwaar)

In third-person perspective games, the player's avatar is visible on-screen and can be seen shooting and getting shot. The avatar can be a player character that shoots (as in *Gun Fight* [1975]) or a vehicle with the capability to shoot, such as a tank, boat, airplane, or spaceship (as in *Combat* [1977], *Air-Sea Battle* [1977], and *Space Duel* [1982]), or crosshairs used as a gunsight that the player moves about the screen (as in *Missile Command* [1980]). Third-person shooting games can be further divided according to the on-screen arrangement of the player's avatar and enemies; vertical shooters limit the movement of the player's avatar to the bottom of the screen and allow the avatar to shoot upward (e.g., *Space Invaders* [1978] and *Centipede* [1980]), whereas side-scrolling shooters typically base their action horizontally (e.g., *Defender* [1980] and *Sea Dragon* [1982]). Other games allow free movement all over the screen and shooting in multiple directions (e.g., *Berserk* [1980] and *Robotron 2084* [1982]).

In first-person perspective shooting games (also known as first-person shooters [FPSs]), the perspective is from the avatar's point of view. The avatar is therefore not present on-screen, although a hand or weapon may extend into view from the bottom of the screen. The first-person point of view may be fixed, as in most shooting gallery games, or in motion, as in games such as *Battlezone* (1980) or *DOOM* (1993). Games with moving first-person perspectives may also require the player to watch for attacks coming from behind and may provide radar scopes or other such devices that allow the player to monitor enemies in off-screen space. Since their earliest incarnations (i.e., *Maze War* [1974] and *Battlezone* [1980]), first-person shooting games have evolved into a large subgenre with a wide variety of examples, ranging from single-player games, to multiplayer games, to massively multiplayer online role-playing games (MMORPGs), and many games in other genres that feature shooting capabilities, even if they are not the focus of the game, contain situations not unlike first-person shooting games. FPSs have also been studied from the point of view of phenomenology.

One type of shooting game arguably falls between first-person and third-person shooting games. These games involve the use of a light gun or other kind of gun-shaped peripheral device that allows the player to shoot directly at objects on-screen, such as *Qwak!* (1974), *Bullet Mark* (1975), and *Outlaw* (1976). Because the player may look along the length of the gun to aim, such games are similar to first-person shooting games, yet the graphics in some of these games remain relatively flat and may have more in common with the graphics of third-person shooting games. A similar effect occurs in such games as *Missile Command* (1980), in which the player moves the crosshairs of a gunsight around on-screen and fires when it is placed over targets.

CHALLENGES AND SKILLS

Shooting games can be designed to pose different challenges that test a variety of skills. First, there is the nature of the shooting mechanisms used; weapons may be used to fire bullets, missiles, grenades, laser bolts, a variety of other projectiles, or even other things, such as the holes that the player uses to connect spaces in *Portal* (2007). Some games will limit the speed at which shots can be fired; for example, after firing, a player may have to wait before the shot leaves the screen or hits something before another shot can be fired. Other games may limit the amount of ammunition a player has or, in a two-player game, provide each player with the same amount of ammunition (as in the Atari VCS 2600 version of *Outlaw* [1976]).

Aiming is one of the skills most often required and may be done through the positioning of a weapon (as in *Space Invaders* [1978] and *DOOM* [1993] or the direct position of a gunsight or crosshairs (as in *Missile Command* [1980] and *Star Wars* [1983]). Some games may also provide the player with a choice of weapons, each with different capabilities, and require the player to choose between them and change from one to the other as the game progresses (as in *Halo: Combat*

Evolved [2001]).

Timing is almost always required as well and is needed for shooting enemies and targets that appear and disappear or those that are moving, which requires the player to compensate for his or her distance and speed of movement. Timing also includes shooting things quickly, especially when returning fire, and shooting things in the right order, with threat assessment determining which targets need to be fired on first. In games in which weapons need to be reloaded, reload time may need to be worked into the timing of the game.

Other skills include the careful use of limited resources (such as ammunition that runs out or batteries that need recharging), knowing when to use different types of ammunition or weaponry, and avoiding shooting at things or characters that should not be fired on (such as civilians or assets that a player needs). Players will frequently need to choose between shooting and other activities, such as evasion, the finding of objects (including additional ammunition), the healing of wounds, and interactions with other players and game characters.

HISTORY

Shooting games can be traced back to their military roots and, commercially, to shooting galleries and electromechanical games, such as *Automatic Shooting Range* (1895), *Target Practice* (1922), *Sharpshooter* (1935), *Safari Gun* (1954), and *Apollo Moon Shot Rifle* (1969). From their earliest conception in the late 1940s, video games have typically included shooting as an activity (see Patent #2,455,992), so it is not surprising that the first video game, *Spacewar!* (1962), was a third-person shooting game, as were the first two commercial video games, *Galaxy Game* (1971) and *Computer Space* (1971), which were both versions of *Spacewar!* The first shooting games to feature a first-person perspective were the mainframe games *Maze War* (1974) and *Spasim* (1974), and the first commercial FPS was *Battlezone* (1980).

The 1970s saw the release of such arcade games as *Tank!* (1974) (similar to certain mainframe games, such as *Panther* [1975]) and *Space Invaders* (1978) and numerous home video games that used "player-missile graphics" programming designed with shooting games in mind. Shooting games rose in popularity and number, and by the decade's end, they had surpassed ball-and-paddle games as the dominant type of video game.

With the rise of three-dimensional graphics during the 1980s and 1990s, first-person shooting games grew alongside third-person shooting games, and each developed into dozens of variations, with such features as limited ammunition, different types of weaponry, and games specifically designed to test different skills, such as aiming, timing, precision, strategy, and quick decision making. Although most games were representational to some degree, other shooting games were abstract in design, such as *Tempest* (1981). Games that introduced new technology to players, such as the virtual reality (VR) game *Dactyl Nightmare* (1992), which used a head-mounted display, were often shooting games so that their gameplay would be intuitive and familiar to players, even when their hardware was not.

Other technologies of the 1980s and 1990s, such as improved graphics, faster

CPU speeds, and more sophisticated gameplay mechanics, helped boost the popularity of the genre, whereas networked games and other online games, and eventually MMORPGs, meant larger groups could play together, providing more intelligent opponents than the artificial intelligence (AI) that the games of that time could provide. Companies such as Id Software, producers of the *DOOM* and *Quake* series, specialized in shooting games and helped bring the genre to maturity during the 1990s (Rehak 2007).

By 2000, shooting games and their various subgenres had well-established conventions as well as technologies that could heighten the gameplay experience, including peripherals especially designed for shooting games. One such device, the 3rd Space Gaming Vest by TN Games, uses force-feedback technology to physically simulate the impact of bullet hits, grenade blasts, and other events to the player's torso. The vest uses eight pneumatic air pockets that inflate and deflate in various places around the player's chest and back to simulate directional impacts. Now that 3-D televisions and VR systems are available, 3-D shooting games will be made for them.

The great diversity and popularity of shooting games makes the genre one of the most widespread and growing, and to some extent, the shooting game genre is perhaps the one used most often to represent video games in the mind of the general public, for better or for worse.

Mark J. P. Wolf

Further Reading

Digibarn Computer Museum. "The DigiBarn's Maze War 30 Year Retrospective." September 24, 2020. Available at http://www.digibarn.com/history/04-VCF7-MazeWar/index.html.

Rehak, Bob. "Genre Profile: First Person Shooting Games." In *The Video Game Explosion: A History from PONG to PlayStation and Beyond*, edited by Mark J. P. Wolf, 187–195. Westport, CT: Greenwood Press, 2007.

Sierra Entertainment

Sierra Entertainment (formerly known as Sierra On-Line) was one of the earliest publishers of home computer games and one of the biggest game companies of the 1980s and 1990s. It was initially known primarily for its graphic adventure games, such as *King's Quest* (1984), but eventually branched out into many other kinds of games. After a series of mergers and acquisitions, the company shed all of its development studios and effectively became a defunct brand by 2008.

The history of Sierra On-Line can effectively be divided into three eras: the period when it was owned and run by its founders, Ken and Roberta Williams; the period in the late 1990s when it was no longer independent but still a major publisher of a wide diversity of games; and, finally, the period of deterioration and effective dissolution in the years following 2000.

Ken Williams founded On-Line Systems in 1979 to create software for business applications. His spouse, Roberta, convinced him to try releasing computer games instead, and in 1980, they released *Mystery House* for the Apple II, a game that is often described as the first home computer–based adventure game with graphics. The couple quickly followed with other titles and swiftly became a major force in the fledgling computer game industry. They moved to Oakhurst, California, near the Sierra Mountains and Yosemite National Park, and changed the company name to Sierra On-Line in 1982 to avoid confusion with another company of the same name.

Sierra created a fairly diverse set of offerings, making its own games, publishing titles developed by other companies (e.g., Sydney Development's *BC's Quest for Tires* in 1983), and porting the popular arcade game *Frogger* to home computer systems such as the Atari 400 (1981) and IBM PC (1983). For a brief time, Sierra even entered the console game market, but it exclusively focused on home computer games after losing money in the video game market crash of 1983. Sierra primarily built its reputation on its significant range of graphic adventure game series. Its Hi-Res Adventure series, including *Mystery House* and *The Wizard and the Princess* (1980), generated significant profits, and in the mid-1980s, the company established a string of hits in the genre. Roberta Williams's own *King's Quest*, released in 1984, was the most well-known and longest-running game—the series eventually included eight titles, the last of which was released in 1998. Other popular series included the *Space Quest* games by Mark Crowe and Scott Murphy, the *Leisure Suit Larry* series by Al Lowe, the *Police Quest* games, Lori and Corey Cole's *Quest for Glory* series, and Jane Jensen's *Gabriel Knight* games.

In the early to mid-1990s, Sierra embarked on a series of acquisitions of other developers. Two of these were particularly notable. The first was Dynamix in 1990. This studio produced several popular Sierra titles, including flight simulators such as *Red Baron* (1990), family-oriented titles such as the puzzle game *The Incredible Machine* (1992), vehicle combat simulators such as the *Earthsiege* games, and the first-person shooter *Tribes* titles. In 1995, Sierra acquired Impressions Games, which released many popular strategy series, such as *Lords of the Realm* (1994) and the *City Building* series, including titles such as *Caesar III* (1998) and *Pharaoh* (1999).

Sierra was an early pioneer in online gaming. In 1991, it launched the Sierra Network, which was dedicated to gameplaying via modems. Although early offerings were mostly board game remakes, the company introduced *The Shadow of Yserbius* in 1992, which makes it one of the earliest graphical multiplayer online role-playing games. In mid-1993, AT&T bought a 50 percent stake in the network and renamed it the ImagiNation Network. AT&T purchased the rest of the network in 1995. Sierra then went on to publish *The Realm Online* (1996), one of the earliest internet-based massively multiplayer on-line role-playing games (MMORPGs). In 1999, the game was sold to Codemasters.

By the mid-1990s, Sierra was a giant in the games industry. Consumer-marketing corporation CUC International, looking to expand into software development, purchased Sierra and educational software company Davidson & Associates (which owned developer Blizzard Entertainment) for nearly $2 billion in shares in 1996. Ken Williams stepped down as CEO of Sierra and by 1998 had retired. In late 1997, CUC in turn merged with HFS, a company primarily known for hotel chains and real estate, to form Cendant. Only a few months after the creation of this new entity, Cendant revealed that its executives had engaged in significant accounting fraud, sending the corporation's stock value into the tank. In the fall of 1998, Cendant sold its entire software division, along with Sierra, to Vivendi.

During this period of corporate tumult, Sierra continued to score successes as a publisher. In 1997, after acquiring Berkeley Systems, Sierra released multiple editions of the quiz game *You Don't Know Jack*. In 1998, it published Valve's hit *Half-Life* and continued this relationship until Valve successfully sued Vivendi for unauthorized distribution of software to cyber cafés, a lawsuit initiated in 2002 and concluded in 2005. However, despite these strong ventures, Sierra was failing to produce sufficient profits for Vivendi. In February 1999, the company laid off many employees and shut down several developers, including Sierra's historic Yosemite studio in Oakhurst, California.

By this time, Sierra no longer had much of a connection to its past and effectively functioned as an administrative division of Vivendi. It continued to lose money, and when Vivendi, facing significant financial pressure, sold its games unit to Activision in the summer of 2008, the newly formed Activision Blizzard, Inc., effectively—although without announcement—retired Sierra, merging all its operations into other parts of the corporation. In 2014, however, Activision revived the brand for publishing indie titles, including a reboot of the *King's Quest* series released in several episodes throughout 2015 and 2016.

Sierra developed or published some of the most well-known and profitable games of the 1980s and 1990s, and many prominent game makers started their careers or spent part of them with the company. In addition to the adventure game makers previously discussed, the list includes Richard Garriott, who published *Ultima II* with Sierra in 1982; Jeff Tunnell, who founded Dynamix and is credited in dozens of games, including *Starsiege* (1998) and *Tribes 2* (2001); and David Kaemmer, who has created multiple racing simulators, including *NASCAR Racing* (1994) and iRacing.com.

Kevin Schut

See also: Adventure Games

Further Reading

DeMaria, Rusel, and Johnny L. Wilson. *High Score! The Illustrated History of Electronic Games*. Berkeley, CA: McGraw-Hill/Osborne, 2002.

Jong, Philip. "Ken Williams." Adventure Classic Gaming, updated July 26, 2006. Available at http://www.adventureclassicgaming.com/index.php/site/interviews/197.

King, B., and J. Borland. *Dungeons and Dreamers: The Rise of Computer Game Culture from Geek to Chic*. New York: McGraw-Hill/Osborne, 2003.

Loguidice, B., and M. Barton. *Vintage Games: An Insider Look at the History of Grand Theft Auto, Super Mario, and the Most Influential Games of All Time*. London: Focal Press, 2009.

Silent Film

Silent film has been an essential source of inspiration for game design, both consciously and unconsciously, nourishing the video game medium with the visual freedom, the attractional quality, and the kinetic wonders of early cinema. A close study of the aesthetics and forms of silent film can help video game developers in their creative choices, as in the case of designer Warren Spector and titles such as *The Misadventures of P. B. Winterbottom* (2010), revealing at the same time a history of hidden influences between both media, from Buster Keaton's slapstick to the universe of *Super Mario Bros.* (1985) and from the action-adventure sequences of *The Thief of Bagdad* (1924) to the gameplay of *Prince of Persia* (1989).

The images of early cinema shared a number of stylistic patterns with the first video games. The absence of synchronized dialogue and the supremacy of visual attractions pushed creators—both early filmmakers and game designers—toward truly imaginative ways of relating the moving image to its audiences. Researchers such as Tom Gunning and Henry Jenkins have studied how playfulness, spectacle, and sight transformation bridged the practices of film with those of magic, circus, music hall, and vaudeville, just as arcades merged with other forms of public entertainment and body performance. As Mark J. P. Wolf (2003) has noted, the visual freedom of early video games opened the path for a certain abstract-motion expression, concerned with gameplay visuality and not necessarily sacrificed to verbal storytelling, a path shared by cinema during its first decades. Such coexistence of images without words, movements without plots, and attractions without boundaries questions our assumptions about film and game culture, proving that the richness, multiplicity, and differential nature of both media goes way beyond the restrictions of allegedly cinematic techniques, such as cutscenes, verbal dialogue, and hyperrealism (that make games look more like talkies but not necessarily like films).

Visually enclosed by what Noël Burch called the "autarchy of tableau," Méliès and Pathé Frères fantasy reels shared with early games an aesthetic awareness of the frame. Acts of gameplay were literally portrayed, as we can see when the children of *Le théâtre électrique de Bob* (1906) connect a couple of electrical marionettes and start a screen fight like the ones in *Street Fighter* (1987) and *Mortal Kombat* (1992). Within the determined, magical space of the frame, a path was open for visually stunning effects and changes in shape, form, and motion. Humans became geometrical figures like the ones in *Les Kiriki, Acrobates Japonais* (1907), game pieces whose movements and combinations resemble the legendary gameplay of *Tetris* (1985). Early mischief gags in comedy reels such as *Pickpock ne Craint pas les Entraves* (1909) soon started to work around chases, jumps, and visual transformations, perfecting a system of vertical and horizontal interplay between the main character, his antagonists, and the surrounding space. Connecting floors (*Pac-Man* [1980]), stairs (*Donkey Kong* [1981]), passageways (*Bubble Bobble* [1986]), and magic vehicles (*Paperboy* [1984]) engaged a certain development in early film montage before they became conventions of video game history.

The discoveries of early film were gradually reinterpreted and systematized, crystallizing throughout the silent masterpieces of the 1920s. In the realm of slapstick, the stunts, jumps, and chases of Mack Sennett's Keystone Kops were refined in the creations of Charles Chaplin, Buster Keaton, Harold Lloyd, Larry Semon, and other silent clowns, just like the primitive moves of *Jumpman* (1983) evolved through the platforms of *Super Mario Bros.* (1985). Among those masters of the gag, Keaton was probably the one who brought his obsession with motion, interfaces, and Rube Goldberg machines to a higher degree of visual lucidity (sublimating Henri Bergson's mechanics of laughter).

The development of sight gags—based on the creation, repetition, and variation of a kinetic pattern through time—resembles the way game designers conceive certain interactions between a moving figure and the surrounding spaces. As in the early *Super Mario* and *Sonic* sagas, slapstick reels captured a screen trajectory by reconstructing the trace of a character's action (jump, chase, pie in the face) and its physical interactions (platform, rotor, slide, cliff, pendulum, pulley, seesaw, zip line, lever). Classic sequences of the silent era, such as the final chase of *Seven Chances* (1925) and the dream sequence of *Sherlock Jr.* (1924), can be regarded as creative tools for designing imaginative gameplay, while connecting with the glitches and silent ruptures of Samuel Beckett's *Film* (1965) and the playful sensibility of contemporary game shows, such as Takeshi Kitano's *Takeshi's Castle* (1986). A kind of absurd playable humor that resurfaces in games that limit the player's bodily performance on purpose, such as *QWOP* (2010) or *Octodad* (2014), foster a series of contingent visual gags frequently shared online as machinima.

The echoes multiply if we compare the canon of Hollywood's silent adventure genre with its equivalents among early video games. The jumps and stunts of Douglas Fairbanks in *The Mark of Zorro* (1920) bring to mind the hanging vines of *Pitfall!* (1982) and *Jumpman* (1983), just like the climbing and sliding between walls and ladders evoke the levels of *Mega Man* (1987). Distinctive action sequences, such as Fairbanks running through the drawbridge in *Robin Hood* (1922), foreshadow memorable moments in games such as *Castlevania* (1986) and *Kid Icarus* (1986), and the final boss structure in the caves of *Metroid* (1986) is literally contained in the catacombs of *The Thief of Bagdad* (1924). Aside from the recurrence of visual motifs, silent film shared with the first video games the use—and triumph—of printed title cards. In the early years, both media shared the necessity of narrating without synchronized dialogue, a technical requirement that encouraged the creation of memorable visual texts: from the revenge island in *The Black Pirate* (1926) to the revenge parody in *Monkey Island 2* (1991), not to mention the unforgettable title cards of *The Legend of Zelda* (1986), a saga that still relies on the wonder of silent words.

These hidden influences are finally amplified by the conscious inspiration on silent film that certain game designers have proved and vindicated. Warren Spector, trained as a film critic before becoming the creator of *Deus Ex* (2000), has publicly praised the imaginative powers of early film to inspire compelling video games, from his evocations of David W. Griffith to the cartoon gameplay of *Epic Mickey* (2010). Even more, silent film aesthetics literally merge with gaming in games such as *The Misadventures of P. B. Winterbottom* (2010), a work that embraces—and turns into specific, brilliant gameplay—sequences from silent milestones such as *Le Voyage dans la Lune* (1902), *Safety Last* (1923), and *Metropolis* (1927), not to mention the minimalist black-and-white sensibility of

Limbo (2010) and *Inside* (2016), where the Kafkaesque monochrome tone goes back to the silent classics of Dreyer and Murnau. Because, after all, as long as game designers such as Fumito Ueda or Jenova Chen rely on the expressivity of bodies traversing landscapes, without the help or hindrance of words, silent cinema will never cease to come back to life under the mask of new video games.

Manuel Garin

See also: Film

Further Reading

Bergson, Henri. *Laughter: An Essay on the Meaning of the Comic*. London: Green Integer, 1999.

Burch, Noël. *Life to Those Shadows*. Berkeley: University of California Press, 1990.

Garin, Manuel. "Gameplaygag: Between Silent Film and New Media." Accessed October 23, 2020. Available at http://www.gameplaygag.com.

Garin, Manuel. "Super Mario, the New Silent Clown: Video Game Parodies as Transformative Comedy Tools." *International Journal of Cultural Studies* 8, no. 3 (2015): 305–309.

Gunning, Tom. "The Cinema of Attractions: Early Film, Its Spectator and the Avant-Garde." In *Early Cinema: Space, Frame, Narrative*, edited by Thomas Elsaesser, 58–65. London: BFI Publishing, 1990.

Gunning, Tom. "Crazy Machines in the Garden of Forking Paths: Mischief Gags and the Origins of American Film Comedy." In *Classical Hollywood Comedy*, edited by Henry Jenkins, 87–106. New York: Routledge, 1995.

Gunning, Tom. "Now You See It, Now You Don't: The Temporality of the Cinema of Attractions." In *Silent Film*, edited by Richard Abel, 71–85. London: Athlone, 1996.

Jenkins, Henry. "Games, the New Lively Art." In *Handbook of Computer Studies*, edited by Jeffrey Goldstein, 175–193. Cambridge, MA: MIT Press, 2005. Available at http://web.mit.edu/~21fms/People/henry3/GamesNewLively.html.

Wolf, Mark J. P. "Abstraction in the Video Game." In *The Video Game Theory Reader*, edited by Mark J. P. Wolf and Bernard Perron, 47–65. New York: Routledge, 2003.

Silicon Knights v. Epic Games

The ownership of a game's code and the legal implications of *mods* (modifications made by others) were called into question in the court case *Silicon Knights v. Epic Games*, making it a case with wide-ranging significance. While working on the game *Too Human* (2008) for Nintendo, the Canadian company Silicon Knights used Epic Games' Unreal Engine 3 to create the game. When the game did not sell well, lead game designer Denis Dyack complained that the game engine was flawed, blaming Epic Games. Silicon Knights then sued Epic Games, demanding licensee support, which would include engine-specific upgrades and updates; Epic had upgraded the Unreal Engine for its own game, *Gears of War* (2006), and Silicon Knights wanted access to the upgraded code, claiming the original code was unworkable.

Epic Games refused to give access to the code and counterclaimed that Silicon Knights had infringed Epic's copyrights and misappropriated trade secrets. Epic accused Silicon Knights of copying proprietary code from the Unreal Engine, removing copyright claims and developer comments within the code.

In May 2012, the decision was granted in favor of Epic Games, requiring Silicon Knights to pay $4.45 million in damages and another $4.678 million for attorney fees. In November of that year, Silicon Knights was also ordered to destroy the engine it had developed for *Too Human* and to remove all copies of *Too Human* as well as the game *X-Men: Destiny* (2011) and three unreleased that were underway at the time, all of which used the copyright-infringing engine. Later, in January of 2014, a new post-trial ruling raised Epic's award to $9.2 million.

The loss of the court case ruined Silicon Knights financially, leading to layoffs and the company's filing for bankruptcy. The result of the case is also that precedent has been set regarding the rights of "mods" that include any proprietary code or any other uses of game code other than by the owners of that code.

Mark J. P. Wolf

Further Reading

Crecente, Brian. "Court Upholds Findings in $9.2M Epic Games, Silicon Knights Lawsuit." Polygon, January 10, 2014. Available at https://www.polygon.com/2014/1/10/5296424/court-upholds-findings-in-9-2-million-epic-games-silicon-knights.

Erker. "Don't Touch That Code: Silicon Knights v Epic and Intellectual-Property Rights." University of British Columbia, Peter A. Allard School of Law, September 23, 2013. Available at http://videogamelaw.allard.ubc.ca/2013/09/23/dont-touch-that-code-silicon-knights-v-epic-and-intellectual-property-rights/.

Kubba, Sinan. "Silicon Knights Ordered to Destroy All Unsold Games Using Unreal Engine 3, Award to Epic Games Doubled." Engadget, November 9, 2012. Available at https://www.engadget.com/2012/11/09/silicon-knights-v-epic-games-judgment/.

Sim Series

The *Sim* series is a successful franchise of simulation games created by designer Will Wright and Maxis Software that was subsequently taken over by major games publisher and developer Electronic Arts (EA). Rather than immersing players directly in first- or third-person gameplay directed toward a linear mission-based structure, the series is credited with pioneering the “god game” genre, which allows players to oversee the creation and maintenance of a larger simulated system from a somewhat removed godlike vantage point. Although the scenarios that inform each *Sim* title vary considerably, most of the series’ games have in common their rejection of fantasy settings in favor of scenarios with origins in the real world, which players may, in many cases, relate to their everyday lives.

The *Sim* series launched in 1989 with the release of *SimCity*, an urban planning simulator that allows players to design, develop, and maintain their own cities. In contrast to training-based computer simulators with their origins in the military, which approximated the experience of flying or driving, *SimCity* was one of the first computer games to perform the type of simulation that dynamically models an entire system. Along with roughly contemporaneous simulation games, such as *Populous* (Peter Molyneux, 1989) and *Civilization* (Sid Meier, 1990), *SimCity* would revolutionize the game experience and industry by helping popularize the new genre of god games and laying an enduring foundation for the rest of the *Sims* series to build on. Rather than adhering to the quest structure most common to video games at the time and placing the player in control of an individual player character, *SimCity* put players in charge of an entire population whose development and well-being depended on the player’s strategic decisions. It also featured an isometric perspective that introduced a new way of looking at gameplay—that of the third-person total overview of an expansive landscape, the scale of which gave the “godlike” impression of observing a vast game world in its entirety.

Both of these innovations made the player feel, quite literally, like a god in the game world. “Mayor” players are presented with an empty landscape that they must clear, plan, and develop according to a range of competing economic, political, and human factors. Players spend their mayoral budget installing power plants and police stations; subdividing residential, commercial, and industrial zones; and creating transportation networks using the editing toolbar that partially frames their God’s-eye view. If enough Sim-citizens like the city the player has built, the population thrives, and so do tax dollars for further development; if they do not like the city, the budget runs dry, and the mayor loses his or her office—in other words, the system, and thus the entire simulation, will fail.

In the wake of its unanticipated success, *SimCity* produced multiple expansion packs and sequels, including *SimCity 2000* (1994), *SimCity 3000* (1999), *SimCity 4* (2003), and *SimCity Social* (2012). Each of these subsequent games takes advantage of the increased processing power of the hardware on which they are played, for example, by offering enriched graphics, more editing tools, and the enhanced ability to zoom in and out of the simulation so that cities may be examined as closely as street level. However, the games’ fans and critics alike have suggested that for all that the visual experience of *SimCity* has changed in later iterations, the nature of its gameplay remains quite faithful to that laid out in its original version.

In addition to achieving critical acclaim and unexpected commercial success, *SimCity* was one of the first computer games to be put to use in education, and by the early 1990s, it had been adopted in more than ten thousand schools in the

United States alone to teach everything from urban planning to geography. However, it has also been argued that the educational value of *SimCity* is not found in how it teaches players simulated skills that they can then apply in the real world, but rather in how it teaches players to think like the computer running the simulation. Ted Friedman (1999) suggests that god games like *SimCity* teach users to internalize the logic of the computer program; to win, you must figure out the rules of the game, predict consequences, and anticipate the computer's responses until your decisions become as smoothly mechanized and intuitive as those of the computer—which, he suggests, is one of the true pleasures of this type of gaming experience.

SimCity's success prompted Maxis to create a wide range of *Sim* spin-offs, allowing players to simulate everything from the minutia of an ant colony (*SimAnt* [1991]) to the expansiveness of an entire planet (*SimEarth* [1990]), with every degree of scope and complexity in between. The diversity of *Sim* spin-offs is evident in their titles, which include *SimFarm* (1993), *SimTower* (1994), *SimIsl*e (1995), *SimTown* (1995), *SimGolf* (1995), *SimCopte*r (1996), *SimTunes* (1996), *SimPark* (1996), *Streets of SimCity* (1997), and *SimSafari* (1998). These latter spin-offs generally proved less commercially and critically successful than the *SimCity* games, and, indeed, the lukewarm sales and reception of most of these titles were believed to have factored into Maxis's 1997 sale to EA. However, there was one notable exception to the lackluster performance of non-*SimCity* spin-offs: *The Sims* (2000), a "virtual dollhouse" (in designer Wright's words) that allows users to create and manage the lives of a family of simulated people, or "Sims."

EA was initially reluctant to release *The Sims* because of its seemingly mundane premise and finally did so with minimal fanfare or promotion. Despite this, *The Sims* quickly became one of the best-selling computer games of all time, spawning multiple expansion packs and sequels, including *The Sims Online* (2002), *The Sims 2* (2004), *The Sims 3* (2009), *The Sims Medieval* (2011), *The Sims Social* (2011), and *The Sims 4* (2014). As with *SimCity*, these later titles have been viewed as innovating the visual aspects of the original game and the degree to which users may customize their Sims and surroundings rather than departing from the original in terms of gameplay. The one sequel that did drastically alter the single-player, off-line format of the *Sims* games—the massively multiplayer online role-playing game (MMORPG) *The Sims Online*—was considered a costly disappointment. (Subsequently rebranded as *EA-Land*, it was shut down and taken off-line in 2007.) Some of the most recent *Sims* and *SimCity* spin-offs, meanwhile, such as *SimCity Societies* (2007) and *MySims* (2007) for the Nintendo Wii and Nintendo DS, combine certain elements of *SimCity* and *Sims* gameplay by allowing players to manage both their Sims *and* their larger urban environment.

Within the *Sim* series, *The Sims* games in particular have been credited with attracting a more diverse demographic of players—especially female players—to video games. *The Sims*' success in broadening gamer demographics has been attributed to the ways in which it deviates from the predominantly masculine gender positioning of video games, creating a game world where crucial decisions revolve around human relationships and the management of domestic space rather than weapon selection or fantastical feats of strength. Players create and customize their Sims in terms of appearance and personality traits and build, customize, and furnish their home environments to help meet (or, in some cases, thwart) their various needs. Sims respond to player input, but they are not wholly avatars that do the player's bidding. They are also directed by artificial intelligence (AI), creating responses and situations that are semiautonomous of the player's control. Just as the mayor of *SimCity* must balance the competing demands of an urban environment, players must juggle the human needs of their Sims, ensuring they receive adequate food, sleep, socialization, employment, and shelter, right down to such minutia as properly timed bathroom breaks. Although players quickly become engrossed in these tasks, some complain that their mundane realism makes them feel like an "underpaid virtual housemaid," in Gonzalo Frasca's (2001) words.

The Sims and its sequels are ostensibly open-ended; players do not work toward a preset endpoint but rather operate according to the broad goal of keeping their Sims content and alive. Because one of the easiest ways to make your Sims happy is to buy them what they want, the game's depiction of consumerism has been greatly debated. Although one side of the debate contends that the tongue-in-cheek nature of *The Sims* actually critiques or at least allows an exploration of excessive materialism (see, e.g., Herz 2000), the other side faults it as a kind of yuppie-training simulator that suggests success is equated with acquiring more and better objects (Kline et al. 2003).

Creator Will Wright has described the *Sim* series as being more "software toys" than actual games because of their open-endedness and lack of a clearly goal-oriented structure. Unlike titles that lead players toward a singular experience of winning or beating the game, the *Sim* games ostensibly allow players to set their own goals and decide for themselves when they have achieved them. This permits players to engage in a variety of play styles and produce a wide range of possible outcomes within the simulated environment. For example, in the *SimCity* games, players may construct their ideal cities in a variety of ways, differently prioritizing such elements as industrial development, residential growth, and urban renewal (to name a few), thus producing a wide range of economic and social landscapes, or they may choose to construct their cities only to obliterate them with a tornado or tidal wave conjured by the games' assorted disaster modes. Similarly, the virtual dollhouse format of *The Sims* games means that players may pursue the more obvious objective of meeting their Sims' needs with a wide variety of consumer purchases and basic life maintenance tasks; however, they may also choose to neglect their Sims' needs and torture them in a variety of ways.

Wright has suggested that his overarching goal for the series was to create game worlds that provide as big a "solution space" as possible, wherein no two players may problem solve in exactly the same way, suggesting the possibility of seemingly infinite solutions and, thus, a gaming experience unique to the player (Pearce 2002). On these grounds, the series has been praised for its success in creating "emergence"—complex, varied results in gameplay emerging out of seemingly simple interactions. Although there are still limits to this emergence enforced by the design and technical constraints of the game software, the *Sim* series has been widely credited as one of the most successful examples of emergent gameplay in video game history.

The *Sim* series has also been cited as evidence that video games can lack any discernible narrative or story, a view commonly espoused by game scholars associated, for a time, with the ludology movement within game studies and its advocacy for studying games as games, not stories. However, the counterargument has been made by Wright himself that the *Sim* games can actually function as a kind of authoring tool in which players can produce their own uniquely personal narratives through their interaction with the simulation. Henry Jenkins (2004) terms these types of narratives "emergent" because they are not prestructured but rather take shape through gameplay specific to the individual player. Players can then share these narratives with the active online community Maxis has cultivated for further engagement with and interest in the franchise—for example, by posting user-created scrapbooks or virtual novels about their *Sim* characters, storyboards, and urban design plans.

EA acquired the franchise rights to the *Sim* series in 1997 when it acquired Maxis. Wright and Maxis initially maintained a lead development role in the series; however, more recent titles (such as *SimCity Societie*s, the *MySims* series, and *The Sims 3*) have been developed and published without the direct involvement of Wright or Maxis, with EA either developing new *Sims* projects internally or tasking them to other external developers. The highly popular *Sims* franchise, for example, is now fully under the purview of EA's in-house Sims Studio. The company also released *SimCity* (2013), a reboot of the series; the mobile game *SimCity BuildIt* (2014); and *The Sims Mobile* (2014).

Over its long life span, the *Sim* series has diversified from being played solely on computers to being ported across a wide range of console platforms, including the most recent generation of systems (i.e., the Microsoft Xbox 360, the Nintendo Wii, and the Sony PlayStation 3).

Jessica Aldred

See also: *Sims, The* Series; Simulation Games

Further Reading

Bittanti, Mateo. "All Too Urban: To Live and Die in SimCity." In *Videogame, Player, Text*, edited by Barry Atkins and Tanya Krzywinska, 29–51. Manchester, England: Manchester University Press, 2007.

Frasca, Gonzalo. "The Sims: Grandmothers Are Cooler Than Trolls." *Game Studies* 1, no. 1 (July 2001). Available at http://gamestudies.org/0101/frasca.

Friedman, Ted. "Civilization and Its Discontents: Simulation, Subjectivity, and Space." In *On a Silver Platter: CD-ROMs and the Promises of a New Technology*, edited by Greg M. Smith, 132–150. New York: New York University Press, 1999.

Herz, J. C. "The Sims Who Die with the Most Toys Win." *New York Times*, February 10, 2000: G10.

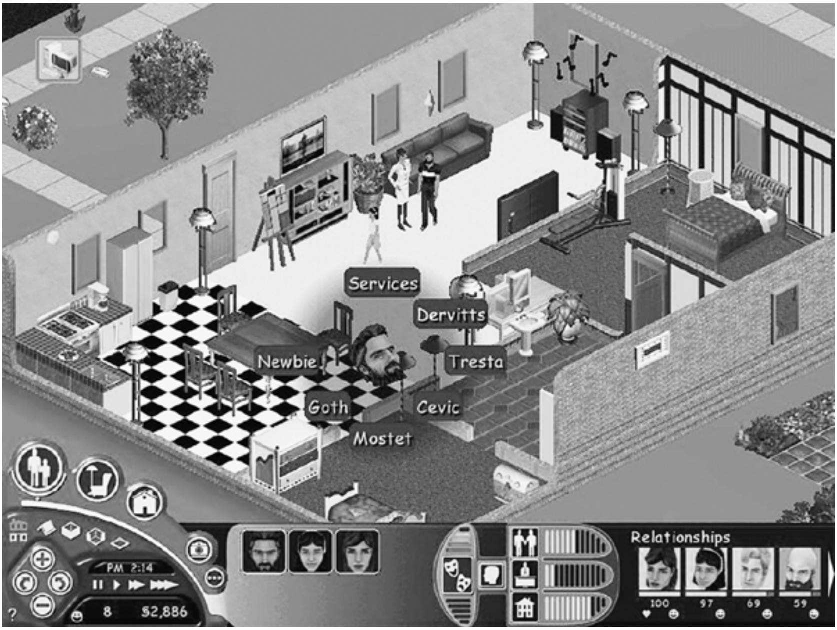
Jenkins, Henry. "Game Design as Narrative Architecture." In *First Person: New Media as Story, Performance, and Game*, edited by Noah Wardrip-Fruin and Pat Harrigan, 118–131. Cambridge, MA: MIT Press, 2004.

Kline, Stephen, Nick Dyer-Witherford, and Greg De Peuter. "Sim Capital." In *Digital Play: The Interaction of Technology, Culture, and Marketing*, 259–293. Montreal, Canada: McGill-Queen's University Press, 2003.

Pearce, Celia. "Sims, Battlebots, Cellular Automata, God, and Go: A Conversation with Will Wright." *Game Studies* 2, no. 1 (July 2002). Available at http://www.gamestudies.org/0102/pearce.

Sims, The Series

The Sims is a series of sandbox/social simulation games created by star designer Will Wright and published by Maxis and Electronic Arts (EA). Players interact with a virtual dollhouse, building and decorating homes and (in later games) other locations for virtual people called Sims. Sims can form relationships, raise families, and progress in various careers, and while there are quests and goals in some versions of the game, play is for the most part open and unending. The Sims have needs that must be met for them to be happy and able to follow player commands. In the original *The Sims* (2000), the needs were hunger, hygiene, bladder, energy, social, and fun. Later versions of the game made minor modifications to these motives affecting Sim moods. In *Sims 4* (2013), *hunger* was replaced by *thirst* for vampire Sims, for example. The Sims speak a made-up language called Simlish and use Simoleons (an in-game currency) to buy and sell items. The majority of *The Sims* games and related content releases are rated T (Teen) by the ESRB, with a handful rated E (Everyone).



A screenshot from *The Sims*. (Courtesy of Mark J. P. Wolf)

Will Wright has cited Activision's *Little Computer People* (1985) as one of his inspirations for creating *The Sims*. Other precursors include Activision's *Alter Ego* (1986), Wright's own *SimCity* series (1989) and *SimAnt* (1991), and Mindscape's *Creatures* (1991). The series is sometimes compared to the Learning Company's *Babyz* (1995), Nintendo's *Animal Crossing* series (2001–17) and *Tomodachi Life* (2013), and Linden Labs' *Second Life* (2003–present).

According to Cory Ondrejka, "The Sims was the first mass-market game to heavily utilize player created content," and EA claims that over 80 percent of available Sims content was user created (Ondrejka 2013, 84). Allowing players to design and share their own game content increases player engagement with the games and extends gameplay possibilities by providing a continual source of new game content at no cost to Maxis. *The Sims Resource* (TSR) is a fansite that was started in 1999 that is dedicated to offering custom content for download (some free, some not). Players design and upload their own designs for all types of items in all four *Sims* games: character designs, skin tones, hair, makeup, and clothing; houses, furniture, floors, and walls; pet designs and clothing; and more. The site credits uploaders for their work using their chosen forum names. For example, "wtrshpdwn" designed and uploaded a male and female version of a T-shirt bearing the Puerto Rican flag for Sims to wear in *Sims 4*. *The Sims Community* was founded by Jovan Jovic´ and has no connection to Maxis or EA, but the site has news and articles about new *Sims* releases and player modifications. *The Sims Catalog* is a fansite dedicated to custom content for *The Sims 4* and promises never to charge a fee for membership.

Creative play of *The Sims* is not limited to designing new game content. Starting with *The Sims*, players adapted the Family Album feature of *The Sims* to tell stories using their Sims. Though the designers intended the Family Album to function like a traditional photo album, storing snapshots of interesting moments in the Sims' lives, players realized that it could also be viewed as a comic book or storyboard. By carefully planning a series of snapshots, players could create simple stories and share them online. In *The Sims 3* (2009), a video camera function was added, allowing players to create in-game movies using their Sims. This coincided with the rise of the machinima phenomenon, and soon machinima productions using *The Sims* appeared. Notable examples include Thuyen Nguyen's *An Unfair War* (2006) and Rooster Teeth's *The Strangerhood* series (2004 and 2015).

The official *Sims* games are relatively uncontroversial, although user-made content lacks oversight and may contain offensive themes or images. *The Sims* games have allowed same-sex relationships between Sims since the first release, which was criticized by more conservative reviewers. In 2019, however, *The Sims 4* was criticized by players for *not* including a lesbian Pride flag along with other LGBTQ Pride objects added to the game on June 18, 2019, as part of its partnership with It Gets Better. The *Sims 4* originally came with a character trait called "insane" that caused the character to act in a random fashion, making the character harder for the player to control. After protests from mental health and disability activists, EA changed the name of the trait to "erratic."

LIST OF GAMES AND THEIR ANCILLARY RELEASES

***The Sims* (2000):** Expansion packs: *The Sims: Livin' Large* (2000), *The Sims: House Party* (2001), *The Sims: Hot Date* (2001), *The Sims: Vacation* (2002), *The Sims: Unleashed* (2002), *The Sims: Superstar* (2003), *The Sims: Makin' Magic* (2003).

***The Sims 2* (2004):** Expansion packs: *The Sims 2: University* (2005), *The Sims 2: Nightlife* (2005), *The Sims 2: Open for Business* (2006), *The Sims 2: Pets* (2006), *The Sims 2: Seasons* (2007), *The Sims 2: Bon Voyage* (2007), *The Sims 2: FreeTime* (2008), *The Sims 2: Apartment Life* (2008).

Stuff packs: *The Sims 2: Happy Holiday! Pack* (2005), *The Sims 2: Family Fun Stuff* (2006), *The Sims 2: Glamour Life Stuff* (2006), *The Sims 2: Happy Holiday Stuff* (2006), *The Sims 2: Celebration! Stuff* (2007), *The Sims 2: H&M Fashion Stuff* (2007), *The Sims 2: Teen Style Stuff* (2007), *The Sims 2: Kitchen & Bath Interior Design Stuff* (2008), *The Sims 2: IKEA Home Stuff* (2008), *The Sims 2: Mansion & Garden Stuff* (2008).

***The Sims 3* (2009):** Expansion packs: *The Sims 3: World Adventures* (2009), *The Sims 3: Ambitions* (2010), *The Sims 3: Late Night* (2010), *The Sims 3: Generations* (2011), *The Sims 3: Pets* (2011), *The Sims 3: Showtime* (2012), *The Sims 3: Supernatural* (2012), *The Sims 3: Seasons* (2012), *The Sims 3: University Life* (2013), *The Sims 3: Island Paradise* (2013), *The Sims 3: Into the Future* (2013).

Stuff packs: *The Sims 3: High-End Loft Stuff* (2010), *The Sims 3: Fast Lane Stuff* (2010), *The Sims 3: Outdoor Living Stuff* (2011), *The Sims 3: Town Life Stuff* (2011), *The Sims 3: Master Suite Stuff* (2012), *The Sims 3: Katy Perry Sweet Treats* (2012), *The Sims 3: Diesel Stuff* (2012), *The Sims 3: 70s, 80s, & 90s* (2013), *The Sims 3: Movie Stuff* (2013).

Content available from the in-game store: *The Sims 3: Riverview* (2009), *The Sims 3: Barnacle Bay* (2010), *The Sims 3: Hidden Springs* (2011), *The Sims 3: Lunar Lakes* (2012), *The Sims 3: Lucky Palms* (2012), *The Sims 3: Sunlit Tides* (2012), *The Sims 3: Monte Vista* (2012), *The Sims 3: Aurora Skies* (2013), *The Sims 3: Dragon Valley* (2013), *The Sims 3: Midnight Hollow* (2013), *The Sims 3: Roaring Heights* (2013).

***The Sims 4* (2013):** Expansion packs: *The Sims 4: Get to Work* (2015), *The Sims 4: Get Together* (2015), *The Sims 4: City Living* (2016), *The Sims 4: Cats & Dogs* (2017), *The Sims 4: Seasons* (2018), *The Sims 4: Get Famous* (2018), *The Sims 4: Island Living* (2019).

Game Packs: *The Sims 4: Outdoor Retreat* (2015), *The Sims 4: Spa Day* (2015), *The Sims 4: Dine Out* (2016), *The Sims 4: Vampires* (2017), *The Sims 4: Parenthood* (2017), *The Sims 4: Jungle Adventure* (2018), *The Sims 4: StrangerVille* (2019), *The Sims 4: Realm of Magic* (not yet released).

Stuff packs: *The Sims 4: Luxury Party Stuff* (2015), *The Sims 4: Perfect Patio Stuff* (2015), *The Sims 4: Cool Kitchen Stuff* (2015), *The Sims 4: Spooky Stuff* (2015), *The Sims 4: Movie Hangout Stuff* (2016), *The Sims 4: Romantic Garden Stuff* (2016), *The Sims 4: Kids Room Stuff* (2016), *The Sims 4: Backyard Stuff* (2016), *The Sims 4: Vintage Glamour Stuff* (2016), *The Sims 4: Bowling Night Stuff* (2017), *The Sims 4: Fitness Stuff* (2017), *The Sims 4: Toddler Stuff* (2017), *The Sims 4: Laundry Day Stuff* (2018), *The Sims 4: My First Pet Stuff* (2018), *The Sims 4: Moschino Stuff* (not yet released).

Other downloadable content: *The Sims 4: Rewards* (2014). Bonus Sims 4 content for owners of *The Sims 3: The Sims 4 Digital Deluxe Upgrade: Life of the Party* (2014), *The Sims 4 Digital Deluxe Upgrade: Awesome Animal Hats* (2014), *The*

Sims 4 Digital Deluxe Upgrade: Up All Night (2017), *The Sims 4: Holiday Celebration Pack* (2014), *Grims Goulish Guitar* (2016). Free download for signing up to a Sims newsletter: *Family Portrait* (2018). Free download for signing up for *The Sims Mobile.*

Spin-Off Games: *The Urbz: Sims in the City* (2004), *The Sims Online* (2002), *The Sims Life Stories* (2007), *The Sims Pet Stories* (2007), *The Sims Castaway Stories* (2008), *The Sims Medieval* (2011), *The Sims Medieval: Pirates and Nobles* (2011), *The Sims Social* (2011), *The Sims FreePlay* (2011), *The Sims Mobile* (2018), *MySims* (2007), *MySims Kingdom* (2008), *MySims Agents* (2009), *MySims Camera* (2009), *MySims Racing* (2009), *MySims Party* (2009), *MySims SkyHeroes* (2010).

Kara Lynn Andersen

See also: Simulation Games

Further Reading

Consalvo, Mia. "It's a Queer World after All: Studying *The Sims* and Sexuality." GLAAD Center for the Study of Media & Society. Available at https://www.academia.edu/654441/Its_a_queer_world_after_all_Studying_The_Sims_and_sexuality.

Frasca, Gonzalo. "*The Sims*: Grandmothers Are Cooler Than Trolls." *Game Studies* 1, no. 1 (2001). Available at http://gamestudies.org/0101/frasca/.

Gee, James Paul, and Elisabeth R. Hayes. *Women and Gaming: The Sims and 21st Century Learning*. New York: Palgrave MacMillan, 2010.

Heliö, Satu. "Simulating the Storytelling Qualities of Life: Telling Stories with the *Sims*." Proceedings of DiGRA 2005 Conference *Changing Views—Worlds in Play*, 2005. Accessed August 1, 2019. Available at http://citeseerx.ist.psu.edu/viewdoc/download?doi = 10.1.1.101.6815&rep = rep1&type = pdf.

Jackson, Gita. "*The Sims*' Insane Trait Sucks." Kotaku, March 7, 2018. Available at https://kotaku.com/the-sims-insane-trait-sucks-1823590379.

Nguyen, Thuyen. *An Unfair War*. 2006. Game Engine: *The Sims 2*. Accessed August 8, 2019. Available at https://archive.org/details/AnUnfairWar.

Ondrejka, Cory. "Escaping the Gilded Cage: User Created Content and Building the Metaverse." *New York Law School Review* 49 (2013): 81–101. Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id = 538362.

Rak, Julie. "Life Writing versus Automedia: *The Sims 3* as a Life Lab." *Biography* 38, no. 2 (Spring 2015): 155–180.

Sihvonen, Tanja. "Players Unleashed! Modding *The Sims* and the Culture of Gaming." University of Turku, Finland, 2009. Available at http://urn.fi/URN:ISBN:978-951-29-3941-1.

Wirman, Hanna. "Playing by Doing and Players' Localization of *The Sims 2*." *Television and New Media* 15, no. 1 (2014): 58–67. Available at https://doi.org/10.1177%2F1527476413505001.

Wtrshpdwn. "Puerto Rican Flag Shirts." August 1, 2019. Available at https://

www.thesimsresource.com/members/wtrshpdwn/downloads/details/category/sims4-sets/title/puerto-rican-flag-shirts/id/1456770/.

Simulation Games

Simulation games generally refers to video games that involve the player in controlling several elements of a dynamic system that is modeled by the video game. The distinction being made in this widespread sense of the term would be between games in which the player principally plays through a position situated within the game's world or arena—for instance, through an avatar in a first-person shooting game—and games in which the player spends a significant amount of time operating interface controls that affect the game's world from a position "above" or outside it. In Sid Meier's simulation game classic *Civilization* (1991), for example, the player manipulates a range of variables concerning the ongoing progress of his or her civilization in relation to that of competing ones (run by the game's software or by other players, in later versions offering multiplayer gameplay). These include the direction of scientific research and technological advance, city building and infrastructure choices, diplomatic relations with other civilizations, and military operations and strategy. The player must also respond to environmental variables such as weather, resource availability, and natural catastrophes. A range of interfaces are used in managing all of these tasks, from windows with lists and tables, to dialogue boxes in which either-or choices are made, to a first-person interface with the leaders of foreign civilizations, to the most characteristic "god game" perspective, looking down on the simulated territory held by your civilization to move units around, develop resources, and conduct military operations.

Although it is always difficult to posit with certainty the first instance of a type of game or indeed any cultural form, *Utopia* (1982) is often taken to be the first video game involving this kind of combination of resource management and strategic turn-based play, although *Stellar Track* (1981), a text-based game published by Sears for the Atari VCS 2600, is another contender for this status of an original strategic simulation, as it was both turn-based and involved limited resource management of weapons, damage, and fuel of the player's Starship avatar. Developed for the Mattel Intellivision, *Utopia* was a two-player turn-based game in which players competed for economic and military supremacy against each other. *The Sims* (2000), designed by Will Wright and part of one of the best-selling video game franchises, is the most well-known simulation game in this sense of the term. Likened by Mary Flanagan to playing with a dollhouse, the game involves the player in managing the everyday activities of a group of simulated human characters, including eating, sleeping, working, and socializing. The player creates the characters' physique and ethnicity, dresses them, manages the household budget, builds and renovates their house, guides them through social and work and study activities in various add-ons, and so on. Will Wright was also the designer of *SimCity* (1989), *SimEarth* (1990), and *SimAnt* (1991). Subsequently, he designed the highly anticipated *Spore* (2008), a game in which players experiment with a model of genetic evolutionary processes to create their own creatures and compete for galactic supremacy against other species.

Another notable simulation game designer is Peter Molyneux, whose *Black & White* series (beginning in 2001) has the player running a "primitive" civilization both from a God's-eye view and as a godlike figure whose controlling moves inspire "belief" in the game world's simulated people. More recently, Johan Andersson and Paradox Development Studio have successfully crafted a reputation for grand strategy titles with fully simulated, procedural narratives with unique characters, families, and politics. Johan Andersson calls this design philosophy one of creating "believable worlds," and it is exemplified in ongoing series such as *Hearts of Iron*, *Crusader Kings*, and *Europa Universalis*.

Understood in this way, simulation games are a subset of strategy games, another common generic classification of games. Video games studies researchers such as Espen Aarseth have pointed out, however, that, in a way, all video games are simulation games. This is because, first, all games can be approached as simulations that model a system or scenario in an artificially circumscribed zone of playful activity (Johan Huizinga's idea of the "magic circle" of play is influential here). Second, the digital electronic computer that is the basis of most video games is in essence a simulation machine. The computer simulates other machines along with established techniques and procedures of all kinds. Software configures hardware and interface technology to operate as if it were a typewriter, musical instrument, video editing suite, digital calculator, telephone, and so on. As a computer game, a video game is always a simulation game of one kind or another.

From this perspective, it is clear that simulation games can also refer to all kinds of other games, such as the sports games that provide the player with a playable model of golf, football, soccer, basketball, tennis, snowboarding, baseball, cricket, and so on. Similarly, flight and vehicle simulation games model the experience of operating a vehicle in its environment, whether that is air, earth, or water. These games usually emphasize audiovisual immersion in the simulated game world, as in aerial combat simulators and racing games. Sophisticated submarine simulations such as *Sub Command: Seawolf-Akula-688(I)* (2001), however, tend more toward a systemic mode of engagement with the environment and its threats through the submarine's instrumentation, imitating the crew's tasks and limitations in a real submarine.

In the 1950s and 1960s, cybernetics and systems theory were significant in the development of both the digital computer and the simulations that were designed with it to model and experiment hypothetically with all manner of cultural and natural phenomena. Flight simulation and the strategic-political modeling of thermonuclear conflict were two of the most significant of these simulational developments for the subsequent development of simulation games in both senses of the term described earlier. Researchers such as Ted Friedman, Henry Lowood, and Tim Lenoir have considered how video games reflect the influence of these theories and technical developments, many of which emerged out of the enormous economic and political investment in military research and development in the anxiety-inducing Cold War climate. Cybernetics conceived of all complex phenomena as a communication system of elements networked together with key points or nodes in which controlling messages could be sent around the network to influence its operation. Systems theory emerged out of statistical methods of analyzing military operations to look for the most successful patterns and the key variables in complex operations such as antisubmarine warfare. It became popular in conjunction with cybernetics as a method of understanding complex phenomena and processes of all kinds, with a view to predicting their outcomes and exploring potential technological and procedural innovations for ensuring control over those outcomes. Simulating the process or phenomena by selectively modeling the salient features of the system with the aid of a computer was a central plank in this method. The computer's calculative power could then be used to run the simulation, modifying the variables and experimenting with different control inputs into the system to gauge their hypothetical effect. As an important element of contemporary computer-based technoculture, video games have profited from these major techno-scientific advances well beyond the confines of the military use of games.

Approaching simulation games in a way that incorporates but also extends beyond the reference to strategic and systemic simulations run from a position of oversight, we could categorize simulation games along two axes. One of these would consider the positioning of the player in relation to the system or phenomenon being simulated and the other the context or expectation of the users. In regard to the first axis, distinctions could be made, for instance, between games that simulate the dynamics of an environment or sphere of activity, such as a civilization, city, anthill, or a business enterprise in games such as *Theme Park* (1994), and those that situate the player in a scenario with narrative features recognizable from film and literary media. In the former, which is essentially the narrower sense of the term *simulation games*, the simulation models the interaction of diverse elements at the level of the environment or whole system that these interactions influence and constitute. In *Theme Park*, the player manages several variables in attempting to run a successful park: park staff and amenities, types of rides and amusements, pricing, consumer engineering of the space to maximize the flow of the simulated paying customers, weather conditions, and so on. The game is about successfully controlling the development of the amusement park entity at a global level. Success is measured by the sale value of the business, and, having made the sale, the player moves on to a new location to build a better park.

More narrative-based scenario simulations position the player within the game world with an interface that is more about utilizing the world's conditions and reacting to their challenges than managing their overall development. Adventure games, role-playing games (RPGs), many shooting games and tactical team shooters, and vehicle simulations could generally be understood as scenario simulations. From a game design perspective, as Diane Carr pointed out about playing Lara Croft in the game *Tomb Raider* (1996), a first-person interface is another kind of vehicle the player "pilots." In these kinds of games, one operates in a simulated space more from an immersed inhabitant perspective. Marie-Laure Ryan's distinction between objective-and-removed versus immersive-and-engaged kinds of player involvement in virtual worlds is relevant to understanding the difference between scenario and systemic/environmental simulation. In these kinds of games, players have intraworldly abilities and technologies at their disposal, such as movement (walk, crawl, duck, jump, swim, operate a vehicle), techniques, or other actions (open a door, start a fire, administer first aid treatment, radio for an air strike or team extraction, and use weapons and attacks). This list includes virtually embodied or "kinesthetic" interaction as well as other kinds of play "in" a simulated space.

Virtual life simulations, from *The Sims* to massively multiplayer online worlds such as *Second Life* (2003), model a version of everyday living rather than a specific scenario or a discrete environment or system. For some game theorists, these are not really "games" because they do not have goals and rules like a game but rather virtual spaces for imaginative play and for interacting with others socially. The latter can take the form of social networking, virtual communications, and the creation of virtual objects for display, trade, and cultural and political activity. *Second Life*, along with other virtual worlds, has attracted much interest for the way in which these activities in a simulated space have come to resemble and have an impact on real-world society, economics, and politics.

In relation to the second axis along which we could distinguish different kinds of simulation games according to their context of usage and development, entertainment, education, and training would be the principal categories of use covering most games. We should note that games, like other media forms, can be adopted for purposes their creators did not anticipate. For example, there was considerable controversy when information surfaced that the alleged perpetrators of the 9/11 terrorist attacks had used flight simulation software as part of their preparation for piloting their seized aircraft to their targets in the United States. These "safe" forms of entertainment now seemed sinister and in need of closer scrutiny.

More generally, the popularity of video games as entertainment forms has stimulated widespread research and development in educational games and simulations. So-called serious games, however, should be understood in terms of the longer history of video gaming technology's expansion from the original military techno-scientific context of simulation development for the serious purposes of training, systems analysis, and strategic simulation. In this regard, 1990s military appropriations of commercial off-the-shelf games, such as the second release in Id Software's influential *Doom* series, *Doom 2: Hell on Earth* (1995), and Spectrum Holobyte's fighter jet simulator, *Falcon 3.0* (1991), led the way in showing the potential of commercial video games for serious gaming. However, the *operational games* used widely across social science, urban planning, education, and other disciplines since the 1960s had already established a solid tradition of systems analysis–based gaming in government and other nonentertainment contexts.

Real Lives 2004 (2004) is an interesting educational use of games because of the way it draws on the potential of simulation to project hypothetical events from initial known conditions. It simulates individual existences across the globe in a turn-based game form. Aimed at high school social science students, the game puts the player in the position of having to make important decisions for his or her given life as he or she matures from child to adult. The game is not immersive but informational. It presents the player with challenges based on projected political, socioeconomic, and health factors affecting people in different parts of the world. These are drawn from statistics and databases, such as the World Health Organization, "Human Development" and economic indices, and so on. The player deals with problems facing children growing up in Somalia, Pakistan, or wherever the accident of birth places one at the start of the game.

A less common but nonetheless significant adaptation of video gaming's simulational potential is its use in critical and artistic registers. Artistic or experimental games is a broad category, but it can include games that use simulation of space, systems, or phenomena in critical and creative ways. In the witty *Kafkamesto* (2006), the player has to try to exit an urban environment from "1922. Somewhere in Prague. Mid-winter," by negotiating ominous bureaucratic obstacles derived from Franz Kafka's novels and stories. More explicitly critical or activist games, such as *September 12th* (2002), use simulation to pose questions about the procedures through which a simulation comes to model a more complex phenomenon. Ian Bogost calls this the "procedural rhetoric" of simulation, arguing that critical work on and in games as simulational forms must focus on this process of making assumptions about how the simulated world or system works and can be "played." The risk of the Bush administration's war on terror strategy—and the way this political logic inhabits the preponderance of military combat video gaming—is the target of *September 12th*'s simple but elegant simulation of a preemptive missile strike against potential terrorist threats that only serves to exacerbate the original problem.

Patrick Crogan and Joshua Jarrett

See also: *Sims, The* Series

Further Reading

Aarseth, Espen. *Cybertext: Perspectives on Ergodic Literature*. Baltimore, MD: Johns Hopkins University Press, 1997.

Aarseth, Espen, and Patrick Crogan. "Games, Simulation and Serious Fun: An Interview with Espen Aarseth." *Scan* 1, no. 1 (January 2004). Available at http://scan.net.au/scan/journal/display.php?journal_id=20.

Bogost, Ian. *Unit Operations: An Approach to Videogame Criticism*. Cambridge, MA: MIT Press, 2006.

Carr, Diane. "Playing with Lara." In *Screenplay: Cinema/Videogames/Interfaces*, edited by Geoff King and Tanya Krzywinska, 171–180. London: Wallflower Press, 2002.

Crogan, Patrick. "*Real Lives 2004*: The Devil You Know." *Junctures* 11 (December 2008): 69–76.

Darley, Andrew. *Visual Digital Culture: Surface Play and Spectacle in New Media Genres*. New York: Routledge, 2000.

Flanagan, Mary. *Critical Play: Radical Game Design.* Cambridge, MA: MIT Press, 2009.

Friedman, Ted. *Electric Dreams: Computers in American Culture*. New York: New York University Press, 2005.

Galison, Peter. "The Ontology of the Enemy: Norbert Wiener and the Cybernetic Vision." *Critical Inquiry* 21 (Autumn 1994): 228–266.

Huizinga, Johan. *Homo Ludens: A Study of the Play Element in Culture*. London:

Paladin, 1970 [1938].

Kaplan, Fred. *The Wizards of Armageddon*. Stanford, CA: Stanford University Press, 1983.

Lenoir, Tim, and Henry Lowood. "Theaters of War: The Military-Entertainment Complex." In *Collection—Laboratory—Theater: Scenes of Knowledge in the 17th Century*, edited by Jan Lazardzig, Ludger Schwarte, and Helmar Schramm. New York: Walter de Gruyter Publishing, 2005.

Light, Jennifer. "Taking Games Seriously." *Technology and Culture* 49 (April 2008): 347–375.

Ryan, Marie-Laure. "Will New Media Produce New Narratives?" In *Narrative across Media: The Languages of Storytelling*, edited by Marie-Laure Ryan, 427–456. Lincoln: University of Nebraska Press, 2004.

Singapore

Singapore has been the creative hub of Southeast Asia for game development and publishing since 2000. By late 2019, there were around fifty game companies listed in Singapore, the country was ranked the world's second fastest in internet speed, and its game market revenue reached USD 102 million. Among the gaming population of 1.1 million people, most video game users prefer playing mobile games. Singaporeans are the world's most frequent game players, playing an average of 7.44 game hours per week.

Singapore's development in its game sector benefits from strong government intervention. Since the beginning, the Singaporean government has implemented notable policies, such as *Media 21* (2003), *Intelligent Nation 2015* (2008), and *Infocomm Media 2025* (2015), to grow the industry's ecosystem. The history of the game industry has three stages: the first wave from 1995 to 2000, the second wave in the 2000s, and the third wave in the 2010s (Chung 2015). These three waves mark the country's industrial transition from an emphasis on foreign capital in the early stages to local independent game developers in the most recent stage.

Three offices are in charge of game industry development in Singapore: the Economic Development Board (EDB), the Media Development Authority (MDA), and the Infocomm Development Authority (IDA). These offices worked with other government offices to form multiagency administrative support. On the one hand, the EDB attracted transnational game companies, such as Koei, Lucasfilm, and Ubisoft, to set up Southeast Asian offices in Singapore. On the other hand, the IDA and the MDA facilitated the growth of the local game industry value chain. They also connected locally made games to global and regional distributors in Singapore. While the IDA concentrated on upgrading Singapore's IT infrastructure, the MDA carried out initiatives and grant schemes to cultivate an industry environment for local start-ups. In 2016, the government merged the MDA and the IDA into one office, the Info-Communications Media Development Authority (IMDA). This merger demonstrates Singapore's decision to position video game policy within the country's wider digitization policy. Game innovation is part of the country's national plan to enhance Singaporean's digital living in the convergence society.

Of the three notable government policies, *Media 21* identified the game industry as one of the country's three focused sectors in Singapore's creative industry development. In this policy, Singapore is envisioned as a global creative-media city. The government planned to create jobs and increase the pay scale for employed workers. Continuous effort was carried on in the *Intelligent Nation 2015* (iN2015) policy, in which the game industry played an increasingly visible role in the country's IT master plan to build a "Smart Nation." This policy adopted smart-city strategies to improve Singapore's influence in the global information/communication sector. The *Infocomm Media 2025* policy required the game industry to carry out further cross-platform innovation. Made-in-Singapore game content started to emerge in the later part of 2000s, when a few government-initiated projects came to fruition.

For instance, the Singapore–MIT Gambit Game Lab implemented a research relationship between Singapore's early developing game industry and prestigious higher education research institutions in both Singapore and the United States. The DigiPen Institute of Technology Singapore introduced a foundation curriculum for game education and began training talented students in game development and design. Many games created through Gambit and DigiPen have won prizes in game competitions. Moreover, Pixel Studio, previously named the Game Solution Center, serves as a one-stop government resource center that provides incubation support to turn new ideas into prototypes. The studio has a mentor program in which industry leaders share their industry knowledge with local start-ups. The game developers that are supported by the studio are often encouraged to expand their design storytelling to include new platforms of virtual reality (VR) and augmented reality (AR). Pixel Studio lists its services as helping in the areas of design thinking, user experience, digital storytelling, immersive experience, content creation, technological innovation, and game development.

At the industry level, Ubisoft and Koei are two long-lasting global game companies that have been active since their operation. LucasArts' Singapore office had to be closed due to the company's shutdown of its global game unit after Disney's buyout of the company in 2012. However, LucasArts Singapore has thrived in animation production, and the office participated in creating several TV series and movie productions that won Emmy and Oscar awards. Popular films made by these global companies include *Teenage Mutant Ninja Turtles: Turtles in Time Re-Shelled* (2009); *Prince of Persia: The Forgotten Sands* (2010); *Star Wars: The Force Unleashed 2* (2010); *Assassin's Creed: Rogue* (2014); *Assassin's Creed: Unity* (2014); *Nobunaga no Yabou 201X* (2015); *Tom Clancy's The Division* (2016); *Ni Oh* (2017); and *Skull and Bones* (2019).

The growth of local game companies is one significant outcome after more than two decades of industry evolution due to policy intervention. The industry is gradually becoming stable as more start-ups emerge and succeed in becoming notable players in the local game industry. Industry synergy is transformed by knowledge transfer when local talents leave their previous work at global game companies to set up independent studios in Singapore. While independent game development bears risks to operate in Singapore's industry, active game studios are BattleBrew Productions, Boomzap Entertainment, Daylight Studios, Ratloop

Joysteak, Takoway, and Touch Dimensions. Some local companies produce games for distribution through Facebook and Google, which offers an Indie Game Accelerator program. This program provides selected indie game developers from Southeast Asia an opportunity to work in close collaboration with a Google team to access the organization's information for global development for the global market of Google Play.

Singapore's game industry has produced an increasing amount of made-in-Singapore content in the independent game scene. Several local games have won awards in the Independent Games Festival, Xbox Indie Game Festival, Taipei Game Show, and Tokyo Game Show. The list of games receiving awards includes *CarneyVale: ShowTime* (2008), *Armor Valley* (2009), *Rocketbirds: Hardboiled Chicken* (2011), *Autumn Dynasty* (2012), *Masquerada: Songs and Shadows* (2016), *The Gentlebros* (2017), *Tiltoff* (2017), and *Songbird Symphony* (2019). Some of these are 2-D games that have been recognized for their strong visual presentation of graphic art. Others stand out as rhythmic games known for their soundtracks and musical storytelling. In particular, *Autumn Dynasty* and *Tiltoff* use the concepts of Chinese calligraphy and Tai Chi to enhance player experience. These games altogether present unique ways to understand Singaporean cultural sensibility, as these games are commercially available and published across multiple platforms, such as Steam, Xbox 360, iOS, Android, Play Station, and Switch.

Lastly, Singapore has emerged as a hub for esports businesses, as esports' popularity is growing rapidly in Southeast Asia. Razor is a global gaming equipment manufacturing company, and Garena is a shopping and gaming platform company. Garena's gaming service, Garena eSports, reaches out to the Southeast Asian market. Both companies are Singapore based and are partially owned by or partnered with China's biggest game company, Tencent.

Peichi Chung

Further Reading

Chung, Peichi. "Singapore." In *Video Games around the World*, edited by Mark J. P. Wolf, 469–494. Cambridge, MA: MIT Press, 2015.

SNES. *See* Super Nintendo Entertainment System/Super Famicom

SNK (Shin Nihon Kikaku) Playmore

SNK Playmore is a software (and former hardware) developer from Japan known for its high-quality two-dimensional games, particularly fighting games; numerous arcade games; and the Neo•Geo home console system. The company was founded by Eikichi Kawasaki under the name Shin Nihon Kikaku (Japanese for "New Japan Project") in 1978. Initially begun as a hardware and software company providing business solutions, SNK soon shifted its focus to producing games for the arcade, starting with *Ozma Wars* (1979). Over the next decade, the company released numerous arcade games, several of which were ported to the Nintendo Entertainment System (NES).

In 1990, SNK introduced the Neo•Geo Multi Video System (MVS), a modular arcade system. The MVS functioned like a home console system in that the games were contained in cartridges that could be easily changed. The cabinets could contain as many as six cartridges at a time, allowing the player to select which game to play. The MVS thus had three major advantages over other contemporary arcade hardware. First, new games could be easily installed. Second, new games were much cheaper than games from other manufacturers because operators only needed to purchase a small plastic cartridge, as opposed to a new stand-alone cabinet. Third, having multiple games in one unit saved valuable floor space. Although other modular arcade systems did exist at the time, notably Data East's DECO cassette system (1980) and Nintendo's PlayChoice-10 (1986), these were aging and lacked the computational power of the MVS. Furthermore, the DECO system's cassettes were famously fragile, and the PlayChoice-10 only offered games already available on the NES. In 1990, one of the major draws of arcade games was their technical superiority to home consoles, and arcade operators relied on a steady influx of new games to bring in customers. Although the MVS was based on old ideas, the advantages it offered over other systems were substantial.

After the success of the MVS, SNK decided that there might be a market for a high-end home game console powerful enough to compete with arcade games. At the time, home consoles were much less powerful in terms of graphics and sound quality. Porting arcade games to consoles such as the NES and SEGA Genesis meant making significant cuts, leading to noticeably inferior products. As such, SNK decided to release a home version of the MVS, known as the Neo•Geo AES (for "advanced entertainment system").

The AES debuted in the United States in 1990 with a launch price of $650. This system included two joystick controllers identical to those used on the MVS cabinet. Games were sold for $200 or more, making the system drastically more expensive than its contemporaries. However, the superior hardware of the AES meant that the games released for it were identical to their arcade counterparts. Despite the system's price tag, SNK continued to manufacture AES units until 1997, and the last official game released for the platform was *Samurai Shodown V Special* (2004), making the AES the longest-running officially supported video game console to date. It should be noted that the AES was designed before games with three-dimensional graphics became mainstream, and its lack of three-dimensional capabilities had a direct impact on the system's gradual decline.

With the arcade market declining and the market for three-dimensional graphics booming, SNK began experiencing financial difficulties in the late 1990s. In 2000, the company was purchased by Japanese pachinko manufacturer Aruze, and it went into bankruptcy in 2001. In the meantime, founder Kawasaki and several executives had left the company to found BrezzaSoft. Kawasaki also founded another company known as Playmore. After SNK's bankruptcy, the company's intellectual property was sold to a variety of Japanese companies, including BrezzaSoft. Playmore then acquired the former SNK properties and purchased BrezzaSoft outright, reforming as SNK Playmore.

In 2016, SNK Playmore dropped "Playmore," officially changing its corporate name back to SNK.

Jason Scott Begy

See also: Arcade Games

Further Reading

Provo, Frank. "The History of SNK." GameSpot, June 11, 2004. Available at http://www.gamespot.com/features/6089278/p–1.html.

Social Media

Although *social media*, broadly defined, could include such things as letter writing and the telephone, it usually refers to the phenomenon of networking, interacting, and generating content on the internet on a wide variety of platforms, such as Wikipedia, Twitter, YouTube, and Twitch, among others. These platforms are often described, without distinctions, as Web 2.0, social media, social networking sites, or participatory media. Although similarities exist between these notions, one needs to look at the history of the internet to understand the nuances. The birth and progressive accessibility of the internet during the second half of the twentieth century meant a separation from the top-down, controlled circuit of information associated with traditional media. New media platforms born during this time enabled different ways of interacting, creating content, and developing social relationships. Usenet was created in 1980 and served as a public discussion media for users around the world. Bulletin board systems (BBSs) were popular until the mid-1990s, helping users exchange messages, files, and news with each other. The end of the 1990s saw a rise in popularity of homepages. Users could personalize their own website and share content with visitors. Then came prominent weblog or "blog" platforms, such as Blogger and LiveJournal. Blogs are used to share personal information with the public. The information is segmented as "entries" ordered by date, with the newest entry being placed at the very top of the blog.

The evolution and popularity of these platforms eventually gave birth to the notion of *Web 2.0*, which predates the term *social media*. As more people gained access to the Internet, Web 2.0 was hailed as a new public sphere where people could debate and exchange ideas without any form of top-down control or mediation. Hence, users could speak out without restrictions, within a space perceived as both neutral and nonregulated. This meant that anyone seeking to share information, tastes, opinions, or content would be given a voice. In other words, Web 2.0 corresponded to the democratization process of creating and spreading information or knowledge. Indeed, the new media of Web 2.0 was designed in a way to encourage user-generated content (UGC) and a do-it-yourself (DIY) ethic, thus giving equal opportunities to everyone. In this sense, users were said to be *empowered*, both on a political and social level (Jarrett 2008). What is more, Web 2.0 commentators raised the fact that users could now gather in communities as a way to oppose and disrupt prevailing unequal relationships (economic, governmental, etc.).

Additionally, scholars such as Henry Jenkins (2006) and Mark Deuze (2007) have written about the participatory nature and culture of Web 2.0. Users and communities are not only the recipients of extensive and rich information found on the internet but also, and more so, its producers and main contributors. They also share a common objective and passion for the task at hand. Therefore, significant relationships are created between like-minded individuals, and a dynamic of teaching and learning (skills, vocabulary, practices, etc.) has become central to this setting. Furthermore, the efforts made and the nature of the content created is highly valued by the users involved. Web 2.0 fostered the building of networks of people sharing similar interests, creating content, and participating collaboratively for a greater cause. In connection to this phenomenon, new words such as *produser* (producer + user) and *prosumer* (producer + consumer) became popularized, especially by scholars (Bruns 2008; Tapscott and Williams 2008) and different industries. Consumers could now co-create products and services with businesses through Web 2.0.

From then on, this rhetoric of Web 2.0 spread itself and shaped how platforms were being designed and how businesses and users conducted themselves on the internet. Although its precise origins are unclear, the term *social media* became more prominent in the 2000s and built on these promises of Web 2.0. In short, social media exhibit an intensification of the characteristics described above: creating, sharing, and consuming content; building and expanding communities; and collaborating, networking, and interacting. Various factors can explain this intensification, such as the growing number of people connected to the internet through different devices (mobile phones, computers, video game consoles, etc.) and the intuitive, malleable, and accessible nature of social media. Platforms often designated as social media include Facebook, Twitter, YouTube, Instagram, Reddit, LinkedIn, and many more.

Some social media platforms capitalize on users' involvement, especially social networking sites (SNS), a branch of social media. As the name suggests, these media aim to create and showcase networks between people that know each other (i.e., friends, colleagues, family) or not (e.g., businesses, celebrities, bands). Accordingly, SNSs offer the possibility to connect with an ever-growing number of carefully selected people and to interact with and within multiple networks. Moreover, SNSs centralize many activities in one place: sharing pictures or videos, publishing comments, creating and frequently sustaining a public profile and self-image, reacting to the news or publications from networks in real time, creating closed groups, and so on.

VIDEO GAMES AND SOCIAL MEDIA

The culture of video games has always been closely associated to the birth and evolution of the internet. With the development of online play, communication platforms (BBS, forums, etc.), and modding tools, video games have both influenced and been influenced by the internet and its participatory culture. For example, in multiuser domains (MUDs), players created and accessed collaborative spaces to play and interact with each other simultaneously. Another illustration would be the community surrounding Id Software's *DOOM* (1993), which used and popularized forums to showcase the game's in-game bugs to Id Software and to share newly created levels and game modifications. As seen in these examples, social media and online video games have, for many years, gone hand in hand; both allow players to meet, interact, and perform diverse actions, and both exemplify the main principles of participatory culture.

Although video games are not considered social media, they nonetheless integrate many communication tools (e.g., text chat) and ways to socialize (e.g., guilds, co-op mode), and the link between social media and video game culture is as strong as ever today. First and foremost, social media allow communities to gather, discuss, and co-create around a particular object of interest: particular video games, game genres, fan practices, and so on; in a sense, social media becomes an extension of these objects. Indeed, communities invest in different social media platforms to collectively reinterpret video game culture, create original content, develop social norms, debate about the "metagame" (the optimal way to play), and so on. Therefore, communities use social media to create their own communal space of discussion and collaboration, which is said to be outside of power relationships.

With this in mind, specific social media platforms are becoming more and more popular for gaming communities. The live video-streaming website Twitch is now one of the central places where people gather to watch players play their favorite games. Some streamers are now prominent figures and have a large number of fans and, in some cases, even sponsors, and esports competitions are also largely followed there. Twitch is designed so that viewers can participate in many ways and interact with streamers by commenting live, buying "bits" to congratulate the streamer, or subscribing to a channel, among other ways. Following the success of Twitch, YouTube has also launched its own built-in livestreaming platform called YouTube Gaming.

Other than livestreaming, YouTube has been an important platform for gaming culture; many of the most popular videos in YouTube's history are of people playing or creating content with video games. For example, machinima videos have long been published on YouTube and have gained a large following. Let's Play videos (gaming sessions where the performer offers informative, witty, spontaneous, or funny comments) are also one such type of videos popularized through individual personalities or collective channels. Other types of videos that have gained notoriety on YouTube are walkthroughs, step-by-step guides on how to beat a game, and speedruns, where the goal is to beat a game or levels in the shortest time according to community-made rules. In many of these videos, the person playing will include a small window showing his or her facial reactions, and viewers will be able to comment and interact.

As for other types of social media, discussion platforms such as the Steam forums, 4chan, Reddit, and Discord allow players to talk about a variety of subjects surrounding video games. The anonymous, accessible, and participatory nature of these platforms lets users discuss with ease and often leads to passionate debates. Many communities gather on these platforms to co-create and extend a video game's culture. We can think of memes or fanfic websites where users write about their favorite video game characters and settings. These platforms function through collaborative efforts; feedback and communication are essential aspects.

Social media also becomes a space for resistance and protest toward different actors. For example, the “Arab spring,” “Occupy Wallstreet,” and “Me too” movements gained traction and became “viral”—that is, they spread and reached a wide number of people quickly—in part with social media. The same principle applies to gaming culture; whether it is to criticize a business decision, the use of inappropriate remarks in a livestream, or an illegitimate journalistic practice, communities use social media to raise their concerns. They may also seek to affect in one way or another, for better or worse, the actors involved: calling for a boycott, giving negative reviews on Steam and Metacritic, gaining the attention of traditional media, doxing, or even sending death threats.

Social media are also used to help other players. In this case, more experienced players can teach newcomers how to play and master a game. This is often seen with detailed and extensive wiki sites, FAQs, and walkthroughs. Social media can also prolong gaming experiences, especially with mods; players can either add mods to an existing game or join modding communities to learn how to mod, test mods, give or receive feedback, and share their own creations. Likewise, communities may use social media to assist studios by participating in early access campaigns, reporting bugs, giving feedback on beta versions, and so on. This is especially the case with small video game studios, which tend to be closer to their communities by interacting frequently with them through social media.

CYBER-UTOPIANISM AND SOCIAL MEDIA

Although social media are celebrated for the opportunities they offer, many problems arise from their usage as well; there is arguably a “cyber-utopianism” (Morozov 2011) regarding social media. Platforms are not neutral, nor do they eliminate power relationships; rather, they are designed according to certain objectives and encourage particular behaviors. This is particularly the case with Facebook, where free social games (e.g., *FarmVille* [2009]) were added to the platform to gain and engage users. Another example would be platforms such as Twitch, where users freely create content and where the proprietary companies can, in many cases, collect, analyze, and sell personal data. Also, user-generated content such as mods can be reappropriated by companies, with or without the creator’s consent. This is what Julian Kücklich (2005) calls “playbour”: the free, voluntary, amusing, and exploited production of content for a company. Encouraged and facilitated by companies, playbour helps companies reduce costs, prolong a video game’s life, gain innovative ideas, and hire creative employees.

Another unattainable ideal is that of equality within communities. Indeed, some users will have a stronger influence and authority within communities. For example, moderators on forums have the ability to delete posts and orient, consciously or not, the official discourse of their community, and some popular streamers strongly influence the meta aspect of games. The transparent nature of social media can then push players to conform to these discourses and norms, for fear of sanctions, such as exclusion, trolling, intimidation, and the like. What is more, this can lead to echo chambers where communities have specific views about gaming culture, ignoring new or different ideas. Toxicity in social media often operates through this phenomenon. In the end, with its many possibilities and limits, social media acts as an inevitable extension to video games and gaming culture, for better or worse.

Patrick Deslauriers

See also: Bulletin Board Systems; Let's Play Videos; Speedruns; Twitch; Walkthroughs; YouTube

Further Reading

Boyd, D. M., and N. B. Ellison. "Social Network Sites: Definition, History, and Scholarship." *Journal of Computer-Mediated Communication* 13, no. 1 (2007): 210–230.

Bruns, A. *Blogs, Wikipedia, Second Life, and Beyond: From Production to Produsage*. New York: Peter Lang Publishing, 2008.

Deuze, Mark. *Media Work: Digital Media and Society Series*. Cambridge, MA: Polity Press, 2007.

Jarrett, K. "Interactivity Is Evil! A Critical Investigation of Web 2.0." *First Monday* 13, no. 3 (2008). Available at http://firstmonday.org/ojs/index.php/fm/article/view/2140.

Jenkins, Henry. *Fans, Gamers, and Bloggers: Exploring Participatory Culture*. New York: New York University Press, 2006.

Kaplan, A. M., and M. Haenlein. "Users of the World, Unite! The Challenges and Opportunities of Social Media." *Business Horizons* 53, no. 1 (2010): 59–68.

Kücklich, Julian. "Precarious Playbour: Modders and the Digital Games Industry." *Fibreculture Journal* no. 5 (2005). Available at http://five.fibreculturejournal.org/fcj-025-precarious-playbour-modders-and-the-digital-games-industry/.

Morozov, E. *The Net Delusion: The Dark Side of Internet Freedom*. New York: Public Affairs, 2011.

Tapscott, D., and A. D. Williams. *Wikinomics: How Mass Collaboration Changes Everything*. New York: Penguin Books, 2008.

Sony Corporation

Sony was founded on May 7, 1946, in Tokyo, Japan, by Akio Morita and Masaru Ibuka and was originally known as Tokyo Tsushin Kogyo Kabushiki Kaisha (Tokyo Telecommunications Engineering Corporation) (Sony Corporation 50th Anniversary Project Team 2002). Sony would go by this name for almost the first ten years of its existence. In 1955, however, the company was about to branch out to the North American market and was concerned that Westerners would have trouble pronouncing the Japanese name. To appeal to the Western market, the company chose the name Sony, not only for its ease of pronunciation and its short length but also because is it similar to the Latin word *sonus*, the root word of *sonic* and *sound,* and is similarity to the word *sonny*, which they hoped would connote a young, energetic, and friendly company (Sony Corporation 50th Anniversary Project Team 2002). The name was so successful that the company officially changed its name in January 1958.

According to Sony's official history, the company that would become Sony was established in the aftermath of World War II when Ibuka founded a company that repaired radios that had been damaged in the war. Morita was about to accept a job as a lecturer at the Tokyo Institute of Technology when a newspaper published an article featuring his old friend Ibuka's company. Morita wrote Ibuka to congratulate him on his success, and Ibuka wrote back urging Morita to join him. Morita turned down the lecturer job, and a few months later, the new company was formed (Nathan 1999).

Although early Sony products included seat warmers and voltmeters, the products that would be their first success were record player needles manufactured from steel recovered from buildings that had been bombed during the war (Sony Corporation 50th Anniversary Project Team 2002). This product would lead to other products in the field of sound reproduction and recording, including the first tape recorder made in Japan and one of the first transistor radios.

Before the invention of the transistor, radios were made with heavy glass vacuum tubes. Transistors were much smaller and less fragile. Although Sony did not invent the transistor, it was the first Japanese company to make them and the first Japanese company to make transistor radios. Although American company Industrial Development Engineering Associates was the first to release a transistor radio, it bought the transistors from another manufacturer. Sony was the first company in the world to make a transistor radio from the transistors on up (Sony Corporation 50th Anniversary Project Team 2002). This radio, the TR-55, could fit in a shirt pocket and was at the time the world's smallest radio. Its success meant that radios were suddenly everywhere as well as the Sony name.

The fact that the radios, which were sold not only in Japan but also the United States, had the Sony name is notable because at the time Japanese products were often seen as inferior. Sony had offers from Western companies to sell the radios, but all of them wanted to sell the products under their name rather than the Sony name because it was unknown. Sony refused to take its name off its products, which built the Sony brand and improved the reputation of Japanese-made electronics.

Sony's strong eye for branding and its desire to design and manufacture a product's base components (as in the case of the transistor radio) were both traits that would define Sony for the next several decades. Not content to follow other companies, Sony has a long history of researching and developing its own formats and technologies. Among them are such successful products as the Trinitron television, the Walkman, three-and-a-half-inch floppy diskettes, the compact disc (CD), the DVD, Blu-ray technology, and the PlayStation systems. Of course, this impulse for developing its own technologies has also resulted in some well-known failures, such as Betamax, which was successful within the broadcast industry but lost to the VHS format in the consumer market; the MiniDisc, which was popular among musicians and audio enthusiasts but not among the public (and was made largely obsolete by solid-state and hard drive–based devices such as the iPod); the

Memory Stick, Sony's own solid-state memory, which is rarely used by companies other than Sony; and the UMD, which was used for games and movies in the PlayStation Portable but was phased out by Sony in favor of downloadable content.

Sony is, of course, a major player in the video game industry with its PlayStation line of consoles, handheld gaming devices, and the Sony Online Entertainment division, which has released numerous massively multiplayer online role-playing games (MMORPGs), including *EverQuest* (1999), *Star Wars Galaxies* (2003), *PlanetSide* (2003), and several others.

In addition, Sony is a multinational company worth more than $172 billion (as of 2018) and is currently involved in practically every aspect of the entertainment industry, from the of televisions, surround-sound home theater equipment, and portable MP3 players to film studios such as Columbia Pictures, television production companies responsible for such shows as *Seinfeld* (1989–98) and *Who Wants to Be a Millionaire* (1999–present), and music studios that release music from a large variety of musicians, including Aerosmith, Will Smith, Santana, and Lady Gaga (Sony 2018). Sony Corporation has a tradition of making innovative and unique products, and there is every indication that tradition will continue through the twenty-first century.

Bryan-Mitchell Young

See also: Sony PlayStation

Further Reading

Asakura, R. *Revolutionaries at Sony: The Making of the Sony PlayStation and the Visionaries Who Conquered the World of Video Games*. New York: McGraw-Hill Company, 2000.

Nathan, J. *Sony: The Private Life*. Boston, MA: Houghton Mifflin Company, 1999.

Sony. "Financial Statements and Consolidated Financial Results for the Fiscal Year Ended March 31, 2018, and Outlook for the Fiscal Year Ending March 31, 2019": 25. Available at https://web.archive.org/web/20191030190225/https://www.sony.net/SonyInfo/IR/library/corporatereport/.

Sony Corporation 50th Anniversary Project Team. "Sony History." 2002. Available at https://www.sony.net/SonyInfo/CorporateInfo/History/SonyHistory/.

Sony PlayStation

The Sony PlayStation was a CD-ROM-based console that served as Sony's first entry into the home video game market. Although the Sony PlayStation was released in Japan on December 3, 1994, and in North America on September 9, 1995, its history stretches back to 1988, when the system was originally conceived as an add-on device for Nintendo's Super Nintendo Entertainment System (SNES) console. Known as the "Play Station" (two words), the device would allow Nintendo to make CD-ROM-based games (Kent 2001). The PlayStation was only conceived as a stand-alone gaming system in 1991, when, after relations between Sony and Nintendo broke down, Nintendo announced that Philips would be creating the CD-ROM add-on for Nintendo (Kohler 2018).

It was logical for Nintendo to choose to work first with Sony and then Philips because both companies had been influential in the creation of the technologies that would make the PlayStation possible. In October 1982, Sony and Philips released the first compact disc, which not only revolutionized the music industry but also became the storage format for the PlayStation and other disc-based video game systems (Nathan 1999). Although the compact disc was originally released as an audio-only format, Philips and Sony began to extend the format, resulting in the CD-ROM format in 1985, which allowed the disc to contain data, and the CD-i format in 1986, which allowed the discs to contain interactive multimedia content (Desmarais 1992).

The Sony PlayStation home video game console, with a controller. (Evan-Amos)

Although Sony did release one early CD-i player in 1991, it was around this time that the relationship between Sony and Philips began to sour, and Philips became the main manufacturer of CD-i units ("Philips CD-i" 2007). Although the CD-i format is generally perceived to be a failure, it was one of Sony's first forays into interactive media, and it was Philips's role in creating this technology that led Nintendo to partner with Philips when the Sony-Nintendo deal fell apart.

The next stop on the journey to the PlayStation was when Sony executive Ken Kutaragi became interested in working with Nintendo in 1986, after Nintendo had released its Famicom Disk System, a proprietary floppy disk–based expansion system for the original Nintendo console. At the time, Sony had already released the widely used three-and-a-half-inch floppy disk. Perplexed as to why Nintendo would use an inferior format instead of Sony's, Kutaragi tried to interest Nintendo in a joint venture with Sony (Asakura 2000). This led to Sony manufacturing the sound chip for Nintendo's SNES (Valay 2016). All the while, Kutaragi tried to convince Nintendo of the benefits of CD-ROMs over game cartridges, but Nintendo was skeptical because CDs took ten to fifteen seconds to load while cartridges were nearly instantaneous (Valay 2016). According to a former Sony executive, Nintendo did not think the CD-ROM add-on for the SNES would be a success (Valay 2016).

This lack of confidence in the format may be the reason why, in 1988, Nintendo signed an agreement with Sony that allowed Sony to be in charge of the CD-ROM format—including the profits and ability to manufacture its own hardware without any input from Nintendo (IGN Staff 1998; Valay 2016). The name "PlayStation" was picked with the reasoning that if a person worked at a "workstation," it seemed to make sense that a person would play at a "playstation" (Asakura 2000).

On June 1, 1991, at the Consumer Electronics Show (CES), Sony announced its deal with Nintendo to the world (Shapiro "Nintendo-Philips" 1991). The very next day, Nintendo took the stage and stunned Sony by announcing that it had entered a deal with Philips to create the CD-ROM-based SNES peripheral (Shapiro "Sony" 1991). Although the exact reasons for Nintendo breaking the contract with Sony have never been revealed, many theorize that Nintendo felt that Sony had too much power in the relationship because its deal with Sony allowed Sony to release its own hardware and games (Kohler 2018; Shapiro "Sony" 1991). In the end, Nintendo's deal with Philips also broke down, and Nintendo would not release a disk-based system until the Nintendo GameCube in 2001. Nintendo's betrayal also spurred Sony to continue working on the PlayStation on its own (Asakura 2000).

When Sony entered the video game market, it was dominated by Nintendo and SEGA, and its success seemed anything but assured. Even many within Sony were skeptical and thought that Sony should stick to more "serious" products and not enter the video game market (Asakura 2000). The PlayStation's eventual success in the marketplace was due not only to its technology but also to Sony's aggressive marketing and licensing deals. The use of compact discs rather than cartridges allowed Sony to utilize the larger 650 MB storage space of the discs and to lower the price it charged other companies to make PlayStation games because compact discs were much cheaper to manufacture than cartridges and had a larger capacity ("How the PlayStation Changed Gaming" 2015; Leone 2018).

What really set the PlayStation apart from the cartridge-based Nintendo 64 and even the disc-based SEGA Saturn was the PlayStation's emphasis on three-dimensional filled-polygon-based games instead of two-dimensional sprite-based games (Asakura 2000). Other gaming systems used flat two-dimensional game characters and objects known as *sprites*, but the PlayStation was able to use *filled-polygon* graphics to create characters and objects that had depth to them and could be seen from any angle. This made the games seem more lifelike and advanced than the visuals of two-dimensional games. Although both SEGA's and Nintendo's consoles could do this as well, they were seen as less powerful and in some ways harder to program for, and did not emphasize polygonal graphics from the start ("How the PlayStation Changed Gaming" 2015; Thorpe 2018).

The PlayStation firmly established Sony's place in the gaming world, leading to the PlayStation 2 (PS2), PlayStation 3 (PS3), and PlayStation 4 (PS4) as well as the PlayStation Portable (PSP) and PlayStation Vita (PS Vita or Vita). By the time the PlayStation was discontinued in November 2006, Sony had sold more than 102 million consoles, nearly eight thousand games had been released for it, and consumers had purchased nearly one billion discs (Sony Computer Entertainment

2011; Sony Computer Entertainment "Cumulative Production" 2008; Sony Computer Entertainment "Cumulative Software" 2008). Its success led to the death of cartridge-based home video game consoles, eventually forced SEGA to stop manufacturing hardware, and popularized home gaming with three-dimensional graphics.

Bryan-Mitchell Young

See also: Sony Corporation; Sony PlayStation 2

Further Reading

Asakura, Reiji. *Revolutionaries at Sony: The Making of the Sony PlayStation and the Visionaries Who Conquered the World of Video Games*. New York: McGraw-Hill Companies, 2000.

Desmarais, N. "CD-ROM in Libraries." In *Encyclopedia of Library and Information Science*, vol. 50, edited by A. Kent, 89–135. New York: Dekker, 1992.

Edge Staff. "The Making of: PlayStation." *Edge Online*, April 24, 2009. Available at https://n4g.com/news/317281/edge-the-making-of-playstation.

"How the PlayStation Changed Gaming." *Retro Gamer* no. 137 (January 2015): 22–32.

IGN Staff. "History of the PlayStation." IGN, August 27, 1998. Available at http://psx.ign.com/articles/060/060188p1.html.

Kent, Steven L. *The Ultimate History of Video Games: From Pong to Pokémon and Beyond*. Roseville, CA: Prima, 2001.

Kohler, C. "The Weird History of the Super NES CD-ROM, Nintendo's Most Notorious Vaporware." Kotaku, September 7, 2018. Available at https://kotaku.com/the-weird-history-of-the-super-nes-cd-rom-nintendos-mo-1828860861.

Leone, M. "The Legacy of PlayStation Creator Ken Kutaragi, in 24 Stories." Polygon, November 26, 2018. Available at https://www.polygon.com/2018/11/26/18080492/playstation-history-ken-kutaragi-sony.

McCarthy, Dave. "PlayStation—The Total History." Eurogamer, November 20, 2006. Available at http://www.eurogamer.net/articles/a_playstationhistory_1.

Nathan, J. *Sony: A Private Life*. Boston, MA: Houghton Mifflin Company, 1999.

"The Philips CD-i Reference Site." 2007. Available at http://www.philipscdi.com/.

Shapiro, E. "Nintendo-Philips Deal Is a Slap at Sony." *New York Times*, June 3, 1991. Available at https://www.nytimes.com/1991/06/03/business/nintendo-philips-deal-is-a-slap-at-sony.html.

Shapiro, E. "Sony, Nintendo's Partner, Will Be a Rival, Too." *New York Times*, June 1, 1991. Available at https://www.nytimes.com/1991/06/01/business/sony-nintendo-s-partner-will-be-a-rival-too.html.

Sony Computer Entertainment. "Cumulative Production Shipments of Hardware." May 24, 2011. Available at https://web.archive.org/web/20110524023857/http://www.scei.co.jp/corporate/data/bizdataps_e.html.

Sony Computer Entertainment. “Cumulative Production Shipments of Software.” September 23, 2008. Available at https://web.archive.org/web/20080923062826/http://www.scei.co.jp/corporate/data/bizdatapssoft_e.html.

Sony Computer Entertainment. “Cumulative Software Titles.” September 21, 2008. Available at https://web.archive.org/web/20080921062349/http://www.scei.co.jp/corporate/data/bizdatatitle_e.html.

“Sony PlayStation.” *Next Generation* 1, no. 24 (December 1996): 47–55.

Thorpe, N. “Inside the PlayStation.” *Retro Gamer* no. 188 (November 28, 2018): 20–29.

Valay, B., trans. “Former Sony Exec on the Cancelled SNES PlayStation CD-ROM, Including Its Last-Minute Death.” Nintendo Everything, November 13, 2016. Available at https://nintendoeverything.com/former-sony-exec-on-the-cancelled-snes-playstation-cd-rom-including-its-last-minute-death/.

Sony PlayStation 2

More than simply a newer version of the original Sony PlayStation, the PlayStation 2 (PS2) has sold almost 158 units as of September 2020, making it the most successful video game console ever made (“Global Unit Sales of PlayStation 2 as of September 2020, by Region” 2020). First released in Japan on March 4, 2000, and in North America on October 26, 2000, the PS2 was the original platform for such landmark games as *Grand Theft Auto III* (2001), *Katamari Damacy* (2004), *Guitar Hero* (2005), and *God of War* (2005) (McCarthy 2006). Remarkably, the PS2 continued to be manufactured until January 4, 2013, well after other systems of its generation had ceased being sold. It is a testament to the staying power of the PS2 that the last game officially released for the system, *Pro Evolution Soccer 2014*, was released in November 2013, the same month as the PlayStation 4 (Crawley 2014).

Although the first PlayStation used CD-ROMs as the storage medium for its video games, the PS2 used DVDs, which not only allowed for much more information to be stored on a single disc but also meant the system could play DVD movies. When the PS2 was first released, DVD players were still fairly expensive and were not as ubiquitous as they are now, so the PS2’s ability to play DVDs was a strong selling point (Kent 2004; McCarthy 2006; Stuart 2013). The PS2’s processor was a custom one codeveloped by Sony and Toshiba that they dubbed the “Emotion Engine.” Containing 10.5 million transistors and eight separate processing units, this processor is capable of 6.2 billion floating point operations per second (Diefendorff 1999). This made the PS2 so powerful that scientists at the National Center for Supercomputing Applications (NCSA) combined seventy of them to create a supercomputer, and Iraq was rumored to have imported thousands of PS2s to use them in guided missiles (Farah 2000; Markoff 2003). However, the Emotion Engine was also very complex. Some said that the PS2 was so complex and unlike traditional computers that programming it was very difficult; many game delays were blamed on the complexity of the

Emotion Engine (Kent 2004).

This complexity may have hurt development, but it did not hurt its sales. With such high sales, it was inevitable that a number of add-ons and peripherals would be released for the system. One of the most popular add-ons for the PS2 was the PlayStation Network Adapter. When the PS2 was released in 2000, it did not come with internet connectivity. The network adapter was released in 2001, and it allowed players to play online with and against other players. Perhaps more importantly, the network adapter also allowed players to install a hard drive into the PS2. Although few games used the hard drive, it was an ability that brought the PS2 into parity with the Microsoft Xbox, which had internet connectivity and a hard drive as standard features. When Sony released the “slim” version of the PS2 in 2004, it integrated the Ethernet port, making the add-on unnecessary, and eliminated the expansion port that allowed a hard drive to be installed (PlayStation 2002).

One of the most groundbreaking peripherals for the PS2 was the EyeToy. Released in 2003, the EyeToy was a camera that allowed the PS2 to “see” the player and allowed the player to interact with on-screen game elements by moving his or her body in a manner similar to what would later appear in the Xbox Kinect (PlayStation Underground 2003). This technology would continue to be used on the PlayStation 3 (PS3) under the name PlayStation Eye. The PlayStation Eye and the PlayStation Motion Controller are the basis of the PlayStation Move technology, which is a motion controller technology similar to that used by the Nintendo Wii (Kent 2004; Marks 2010).

Another highly successful peripheral that was first released for the PS2 but would later be released for practically all video game systems is the guitar-shaped controller used by the *Guitar Hero* series of games. Released in November 2005 in North America, the original *Guitar Hero* game came with a controller roughly three-quarters the size of a real electric guitar. Although there were earlier guitar-inspired arcade games, it was the PS2 that first brought the instrument-based rhythm games to popularity in North America, and *Guitar Hero* sequels and spin-off games would be released for other systems.

When the PS2 was released in Japan and then in North America, the demand far exceeded the supply (McCarthy 2006). With stores quickly selling out, units could be found for sale at online sites such as eBay for as much as $1,000. There was even a report that one boy in Japan was so disappointed he could not get a PS2 that he committed suicide (Kent 2004). Although SEGA hoped that it could capitalize on the PS2 shortage by selling more of the Dreamcast consoles, it was unable to do so, and on January 31, 2001, SEGA announced that it would stop making gaming hardware (Kent 2001).

Although Sony has stopped selling the PS2, the number of consoles sold and the number of games made for the system ensure that it will be remembered as a high-water mark for home video game consoles.

Bryan-Mitchell Young

See also: Sony Corporation; Sony PlayStation 3

Further Reading

Crawley, D. “Playing the Last PlayStation 2 Game Ever Made.” Venture Beat, February 2, 2014. Available at https://venturebeat.com/2014/02/02/playing-the-last-playstation-2-game/.

Diefendorff, K. “Sony’s Emotionally Charged Chip.” *Microprocessor Report* 13, no. 5 (1999): 1–6.

Farah, Joseph. “Why Iraq’s Buying Up Sony PlayStation 2s.” *WorldNetDaily* (*WND*), December 19, 2000. Available at http://www.wnd.com/2000/12/7640/.

Gough, Christina. “Global Unit Sales of PlayStation 2 as of September 2020, by Region.” *Statistica*, September 15, 2020. Available at https://www.statista.com/statistics/1101876/unit-sales-playstation-2-region/#:~:text=Cumulative%20sales%20of%20PlayStation%202%20by%20region%202020&text=In%20the%2020%20years%20since,55%20million%20units%20in%20Europe.

Kent, Steven L. “PlayStation 2 Timeline.” GameSpy, February 18, 2004. Available at https://web.archive.org/web/20040703102355/http://www.gamespy.com/articles/494/494408p1.html.

Kent, Steven L. *The Ultimate History of Video Games: From Pong to Pokémon and Beyond*. Roseville, CA: Prima, 2001.

Markoff, J. “From PlayStation to Supercomputer for $50,000.” *New York Times*, May 26, 2003: C3.

Marks, R. “EyeToy, Innovation and Beyond.” PlayStation.Blog, November 3, 2010. Available at https://blog.us.playstation.com/2010/11/03/eyetoy-innovation-and-beyond/.

McCarthy, D. “PlayStation—The Total History: Part 3: The PS2 Years and the Build-Up to the PS3.” Eurogamer, November 22, 2006. Available at https://www.eurogamer.net/articles/a_playstationhistory_3.

Plant, Mike. “Top 10 Best-Selling Videogame Consoles.” Guinness World Records, December 21, 2018. Available at http://www.guinnessworldrecords.com/news/2018/12/top-10-best-selling-videogame-consoles-551938.

PlayStation. “PlayStation 2 Gets Stunning New Look.” September 21, 2004. Available at https://www.sony.com/en_us/SCA/company-news/press-releases/sony-computer-entertainment-america-inc/2004/playstation2-gets-stunning-new-look.html. http://us.playstation.com/corporate/about/press-release/227.html.

PlayStation Underground. “EyeToy.” November 28, 2003. Available at https://web.archive.org/web/20031128085224/http://www.us.playstation.com/games.aspx?id=SCUS-97319.

Roper, C. “Fingers-On with Guitar Hero.” IGN, October 19, 2005. Available at https://www.ign.com/articles/2005/10/20/fingers-on-with-guitar-hero.

Stuart, K. “PlayStation 2 Manufacture Ends after 12 Years.” *The Guardian*, January 4, 2013. Available at https://www.theguardian.com/technology/2013/jan/04/playstation-2-manufacture-ends-years.

Sony PlayStation 3

Sony Computer Entertainment's (SCE) PlayStation 3 (PS3) is part of the seventh generation of video game consoles, alongside the Nintendo Wii and the Microsoft Xbox 360. SCE released the PS3 in 2006, on November 11 in Japan and November 17 in North America. Because of a shortage in the materials required to produce the newly developed Blu-ray optical drive, these release dates were not only much later than originally anticipated, but the number of units produced fell short of SCE's target by 50 percent (1up.com 2006). Consequently, the releases for Europe and Oceania would only begin in March of the next year. Although shortages are common among hardware releases, the Xbox 360 sold 75 percent more consoles during its initial launch than SCE did with the PS3. Worldwide, the PS3 has sold more than thirty-five million consoles, roughly five million less than the Xbox 360, although this margin has been narrowing.

Sony Corporation (SCE's parent company) promoted the optical drive as part of its professed strategy to promote high-resolution film and gameplay, eventually leading to the development of its 3-D hardware equivalents. Sony, meanwhile, would capitalize by synergistically selling high-definition televisions and eventually 3-D TVs (Greenfeld 2010). Without the drive, the data transfer from disc to screen would be too slow and require too many discs. However, given the relative cost to produce the drives—in materials, delays, and sales—a heavy burden was placed on Sony, which priced the PS3 at $399 and $499 (the latter sold at more than $300 below cost), $100 more than the Xbox 360 (Quilty-Harper 2006). To compare, Blu-ray players without the hard drive, graphics processor unit (GPU), and central processing unit (CPU) were sold for the same price.

The reason for this discrepancy, beyond the Blu-ray drive, is the CPU. Developed by Sony, Toshiba, and IBM, the PS3's Cell processor boasts a unique and costly architecture. Both the PS3 and Xbox 360 have a core processor based on IBM's 970 PowerPC, but the PS3's is purposed to delegate tasks to eight other processors, the Synergistic Processing Elements (SPEs). Although the GPU, the RSX: Reality Synthesizer, is somewhat inferior to the Xbox 360's GPU, it can still render HD images and outperform the Xbox 360 by unloading its processing burdens to the Cell processor. This new architecture was projected to be useful in the future of programming, allowing for a comparatively high number of calculations per second, but it consequently stunted the early development of games because of the increased difficulty to optimally program it, a problem furthered by Sony's later admitted lack of available programming libraries ("Q&A" 2010). In addition to forcing an advancement in software design, the processor has been used to exemplify "the boundaries in computer technology that are being pushed by the demand for video games" (Crandall and Sidak 2006).

To mitigate the perceived cost, SCE designed the PS3 to act as a multimedia computer, enabling Blu-ray and DVD film viewing, web browsing, music and photograph display and storage, and online video chat. What is more, it enabled the PS3 to be backward compatible, able to play games from the PlayStation and the PlayStation 2 (PS2), and work as a Linux machine. With Linux installed, the PS3 could additionally work with scientific research by contributing remote processing power. With time, however, SCE removed the backward compatibility for PS2 games and other operating systems and went so far as to release a firmware update stopping any Linux-installed machine from working. Although its hardware changed during its operational lifetime, varying its size and hard drive space, its processing power remained stable, ensuring that all versions of the PS3 could play the same PS3 games.

The PS3's game controller, dubbed the DualShock 3, looked nearly identical to its predecessor, the DualShock 2, but it featured accelerometers capable of detecting movement on six axes, providing opportunities for game developers to have players produce different trackable gestures. In addition, the PS3 was able to handle seven operational controllers at once; however, there were fewer than a dozen games that allowed for more than four local players. With the release of the PS3, Sony launched the PlayStation Network, from which players could download games, updates, extra content, and play with others online. Unlike the Xbox 360's network, there was no monthly fee, ultimately resulting in less functionality and fewer services.

The initial set of games released alongside the PS3 totaled a dozen because many were delayed, and one, *NBA Live 07* (EA Sports, 2006), was canceled. Of these releases, only four were PS3 exclusive: *Genji: Days of the Blade* (SCEI, 2006), *Untold Legends: Dark Kingdom* (Sony Online Entertainment, 2006), *Mobile Suit Gundam: Crossfire* (Namco Bandai Games, 2006), and *Ridge Racer 7* (Namco Bandai Games, 2006). These fared somewhat poorly, and because of the delay in the PS3's release, the cost of its hardware, and competition from the Xbox 360, SCE lost a large portion of the market share it had previously taken from Nintendo and SEGA in 1994 with the PSX and again in 2001 with the PS2. Its sales would recover in 2009 with its redesigned hardware, nicknamed the PS3 "Slim"; its $200 price reduction; and the critical mass of high-budget proprietary releases such as *Little Big Planet* (Media Molecule, 2008), *Metal Gear Solid 4* (Kojima Productions, 2008), *Demons' Souls* (From Software, 2009), *Uncharted 2* (Naughty Dog, 2009), *Final Fantasy XIII* (Square Enix, 2010), and *God of War III* (Santa Monica Studio, 2010). Critically, these games placed the PS3 as the console with the most exclusive titles having won Game of the Year from nearly all video game reviewing websites and magazines. With this shift toward profitability came a new logo and the slogan "It Only Does Everything." From this campaign, a second slogan emerge with the announcement of the PlayStation Move at the 2010 Entertainment Electronics Exposition: "This Changes Everything."

The PlayStation Move was a new controller meant to provide physical affordances otherwise untracked by the DualShock 3. The Move most closely resembled Nintendo's Wiimote—but with fewer buttons—with an analog trigger and a glowing LED orb capable of being tracked by the PlayStation Eye (SCE's previously released webcam). Because of its distinct spherical shape, the PS Eye could track the Move in three dimensions, correlating the captured size with a distance from the camera. This tracking was doubled by an internal gyroscope and embedded accelerometers, enabling new forms of precision of which the Wii was incapable. In addition, SCE announced the addition of a "sub-controller" to supplement the PS Move, much like Nintendo's Nunchuk for the Wiimote. Although the PS Eye had been used for gestural interfaces, it saw limited success, although with the release of the Xbox 360's Kinect, a motion-sensing set of cameras used for gestural interfaces, it found a small resurgence with full-body tracking for *Kung-Fu Live* (2010) and head tracking for *Gran Turismo 5* (2010).

The addition of motion control in console gaming was been touted as a means to further extend the life cycles of the PS3 and Xbox 360. Although console generations have historically lasted only five years before being replaced by newer models, the PS3's generation was thought to break that pattern and continue past a seven-year mark (Ivan 2009).

William B. A. Robinson

See also: Sony Corporation; Sony PlayStation 4

Further Reading

Crandall, Robert W., and J. Gregory Sidak. "Video Games: Serious Business for America's Economy." *Entertainment Software Association Report, 2006*. 2006. Available at http://ssrn.com/abstract=969728.

Greenfeld, Karl Taro. "Saving Sony: CEO Howard Stringer Plans to Focus on 3-D TV." *Wired*, March 22, 2010. Available at http://www.wired.com/magazine/2010/03/ff_sony_howard_stringer/.

Ivan, Tom. "Analyst: No New Console Cycle before 2013." *Edge*, May 1, 2009. Available at http://www.nextgen.biz/news/analyst-no-new-console-cycle-before–2013 (site discontinued).

1UP.com. "NPD: DS Sells Muchos, Sony Underships." December 7, 2006. Available at http://www.1up.com/do/newsStory?cId=3155757 (site discontined).

"Q&A: Shuhei Yoshida President, Sony Computer Entertainment Worldwide Studios." *Edge*, August 2010: 217.

Quilty-Harper, Conrad. "PlayStation 3 Estimated to Cost $800 per Unit." Joystiq.com, February 18, 2006. Available at https://www.engadget.com/2006-02-18-playstation-3-estimated-to-cost-900-per-unit.html.

Sony PlayStation 4

The Sony PlayStation 4 (PS4) is part of the eighth generation of video game consoles, alongside the Nintendo Wii U and the Microsoft Xbox One. The PS4 was developed and released by Sony Interactive Entertainment (SIE), which represents the entire PlayStation brand, including hardware, software, content, and network operations. In 2016, Sony merged two of its entertainment businesses, Sony Computer Entertainment and Sony Network Entertainment, to form Sony Interactive Entertainment. Furthermore, the headquarters for SIE was moved to San Mateo, California. Sony Computer Entertainment was founded in 1993 to launch the original PlayStation, and since then, it had been headquartered in Tokyo. According to Kohler (2016), this change in headquarters signals a shift in priorities and business of the PlayStation system, including not only the console but also the services it provides, such as online gaming and streaming services.

The PS4 was launched on November 15, 2013, in North America; November 29 in Europe, Latin America, and Australia; December 2013 in other Asian regions; and February 22, 2014, in Japan. Physical editions of PS4 games come on Blu-ray discs, and the console can read movies on Blu-ray discs and also supports DVD playback. Eric Lempel (2018), the senior vice president of PlayStation Worldwide Marketing, states that more than 86.1 million hardware units and over 777.9 million software units have been sold worldwide. The PS4 had several new features that enhanced the gaming experience; it emphasized the social aspects of gaming by allowing players to stream gameplay sessions online, and it also introduced a redesigned and improved controller.

The PS4's DualShock 4 wireless controller had several new features that distinguished this controller from its predecessors. The analog sticks and triggers had been refined, and their surface was concave, similar to the ones found in an Xbox 360 controller. The traditional “Start” and “Select” buttons were merged into a single “Options” button, which allowed players to pause games and access the game menu. The “Share” button allowed players to upload gameplay videos and screenshots directly from the PS4 system. Moreover, players could livestream their gameplay without interrupting the game itself, and they could use “Share Play” to share game screens with other players in a party while playing. Other new features included the touchpad, a capacitive panel meant to add supplementary interactions within games. In *Killzone: Shadow Fall* (2013), the personal attack drone OWL can be controlled using the touchpad, which also provides access to the drone's several modes. However, very few games have used the touchpad since the launch of the PS4, and it is mostly used to access in-game menus.

The DualShock 4 has a light bar that changes color depending on the different situations players encounter during gameplay. For example, while playing the remastered version of *Spyro the Dragon* that is part of the *Spyro Reignited Trilogy* (2018), the light bar changes color according to the health of Sparx, Spyro's companion. The controller also has a built-in speaker that allows sound effects to come directly from the controller. The feature is used, for example, in *Spelunky*

(2014), where the location of the damsels in distress is signaled by the sounds they make, and they are heard through the speaker in the controller. The controller also has a stereo headset jack that allows players to connect their headphones directly to the controller. The DualShock 4 has motion sensors already installed, without the need of an additional controller, such as the PlayStation Move controller. The physical affordances can be seen in games such as *The Walking Dead: The Final Season* (2018), where players have to tilt and rotate the controller during certain points of the game, mostly in sequences that involve fighting zombies.

When it was first launched, the PS4 was available with a 500 GB hard disk drive. Since then, two redesigned models have been released, including the PS4 Slim and the PS4 Pro. The PS4 Slim was released on September 15, 2016, and is 40 percent smaller in size than the original PS4 model. It was sold at the same price as the original version of the PS4, also with 500 GB of memory. A model with 1 TB was later released, with no change in price. In general terms, there are very few changes between the original PS4 and the PS4 Slim. According to Walton (2016), this version is mostly a less expensive, better-looking PS4, and the console to buy for users new to the system. A few months later, on November 10, 2016, the PS4 Pro was launched worldwide. It is an upgraded version of the PS4, with improved hardware to render 4K, which is high-definition (HD) video that has four times the resolution of 1080p HD video. It is also compatible with HDR television sets and offers impressive graphical details in the latest games developed for the PS4.

The PS4 stands out from other eighth-generation consoles because of its price, its virtual reality (VR) compatibility and library, and its exclusive games. Even seven years after launch, PS4 Slim and PS4 Pro are less expensive than their Microsoft counterparts, Xbox One S and Xbox One X. The PlayStation VR is a VR headset that offers 360-degree vision, 120 frames per second, 3-D audio, and a built-in microphone. It also includes the PlayStation camera, which tracks the position of the headset, and *PlayStation VR Worlds* (2016), a collection of five different VR experiences. Moreover, some of the most well-known and well-received titles for the PS4 have found their way into the PlayStation VR library, such as *Resident Evil 7: Biohazard* (2017), *DOOM VFR* (2017), *The Elder Scrolls V: Skyrim* (2017), and *Borderlands 2 VR* (2018). Finally, another considerable advantage of this console is its vast library of exclusive games. Among the exclusive titles for the PS4 are *God of War* (2018), *Marvel's Spider-Man* (2018), *Bloodborne* (2015), and *Horizon Zero Dawn* (2017), to mention just a few. These games have been critically acclaimed, and most of them have won several game awards. Other exclusive releases include *The Last of Us: Part II* (2019), an action-adventure game and the sequel to the equally acclaimed *The Last of Us* (2014), and *Death Stranding*, an action game developed by Kojima productions. The PS4 far exceeded the expectations it created at launch, and it was succeeded by the PlayStation 5 in November of 2020.

Rita Santoyo Venegas

See also: Sony Corporation

Further Reading

Hollister, Sean, Ross Miller, and David Pierce. “Sony PlayStation 4 Review.” The Verge, November 15, 2013. Available at https://www.theverge.com/2013/11/15/5106888/sony-playstation-4-review.

Kohler, Chris. “Sony Interactive Entertainment Merges PlayStation Biz Units.” *Wired*, January 26, 2016. Available at https://www.wired.com/2016/01/sony-interactive-entertainment/.

Lempel, Eric. “Celebrate the Fifth Anniversary of PlayStation 4.” PlayStation.Blog, November 15, 2018. Available at https://blog.us.playstation.com/2018/11/15/celebrate-the-fifth-anniversary-of-playstation-4/.

Sony Interactive Entertainment. “PlayStation through the Years.” 2019. Available at https://www.playstation.com/en-gb/explore/ps4/playstation-through-the-years/.

Walton, Mark. “PS4 Slim Review: A Smaller, Sexier Console with Few Compromises.” Ars Technica, September 7, 2016. Available at https://arstechnica.com/gaming/2016/09/ps4-slim-review-2/.

Sony v. Bleem

The outcome of the 2000 court case *Sony v. Bleem* is useful for the video game industry as well as scholars and publishers who publish work about video games. The case established that the use of screenshots from video games falls within the boundaries of fair use even when that use is *commercial* and even when that use is *hostile*. Thus, scholars and publishers need not ask for permission to use screenshots in their work.

The case arose when Bleem, a company that produced emulation software for playing games for the Sony PlayStation on personal computers, released advertising in which it compared screenshots from the PlayStation with imagery of the same games from its emulator, hoping to demonstrate that the increased resolution available on a computer produced a game image better than the PlayStation itself did. Sony sued Bleem for intellectual property violations, one of which was the claim that using Sony’s imagery in its advertising violated the copyright on those images. Bleem maintained that comparative advertising fell within fair use.

The court looked at the four factors established in the 1976 Copyright Act:

> (a) the purpose and character of the use, including whether such use is of a commercial nature or is for nonprofit educational purposes; (b) the nature of the copyrighted work; (c) the amount and substantiality of the portion used in relation to the copyrighted work as a whole; and (d) the effect of the use upon the potential market for or value of the copyrighted work.

In the end, the court found in Bleem’s favor, ruling that the use of a screenshot (which it refers to at one point as “an inanimate sliver of a game”) does not require permission.

The case ended with the court concluding the following:

> It is a fair use for Bleem to advertise comparatively only between what PlayStation games actually look like on a television and what they actually look like on a computer when played with the emulator. It is in this context alone that the comparison is necessarily Sony specific. Otherwise, Bleem must be content to make its comparison without using another's copyrighted material. We are persuaded by the need for Bleem to impose minimally upon Sony's copyright with respect to these screen shots because there is no other way to create a truly accurate comparison for the user. The way of simulations is a slippery one for Bleem and if it chooses to embark upon it, it must do so without the support of Sony's copyright. With that limitation in mind, we conclude that Bleem's use of Sony's copyrighted material was fair. (*Sony Computer Entertainment America Inc v. Bleem LLC* May 4, 2000)

Although Sony lost on all counts to Bleem about the use of Sony screenshots on its packaging, the legal fees involved in the litigation were too much for the small company to bear and apparently the cause of Bleem's filing for bankruptcy and going out of business.

Mark J. P. Wolf

See also: Video Game Studies

Further Reading

Sony Computer Entertainment America Inc v. Bleem LLC. May 4, 2000. Available at https://h2o.law.harvard.edu/cases/5198.

Sound

Along with graphics, sound provides information needed for gameplay, reinforces agency, and aids the induction of a vast spectrum of emotions, which, in turn, impact the gamers' decision-making processes and sense of involvement or immersion. Therefore, a game's sonic aesthetic results from the need to support gameplay (both from cognitive and affective standpoints) and often to elicit a strong feeling of presence or sense of place within a game world (Jørgensen 2008). That said, many other internal and external factors intervene in the creation of a sonic aesthetic.

From the simple sounds of early arcade games (which often used sound to attract players) to the most sophisticated digital signal processing (DSP), sound has always been constrained by technology. Yet, according to Karen Collins, the sonic aesthetic of video games is not purely a product of hard technological determinism; the relationship between technology and games should be envisioned as an ongoing mutual influence (Collins 2008, 5). Designers work around technological constraints as technology continues to develop. For instance, in the 8-bit era, music looping was one method used by designers to circumvent memory limitations, but today it is often considered an outdated way to score a video game. Other techniques in interactive and adaptive music have thus been developed to address the growing expectations of designers and the gaming community (see Audio [Dynamic, Interactive, and Adaptive]). In 1991, for example, LucasArts' Michael Land (collaborating with Peter McConnell) developed iMUSE, an interactive music system that allowed closer synchronization between musical cues and in-game events. Land wanted music to respond to unpredictable interactive events and transition more subtly between themes. The desire for better game audio has motivated technological development, which has, in turn, helped sound evolve; at the same time, technological constraints have often given games a unique sound aesthetic.

Economic and ideological factors have also come into play, as games' budgets, development time, and the creativity of designers vary. The sound of a low-budget game might be done by a single person (in the early days of video game history, all sound was done by the game programmer), whereas the sound department of a big-budget game may include a sound director, sound designers, composers, and audio programmers as well as dialogue and voice-over artists.

Market demands and demographics also factor in: differing age groups, casual versus hardcore gamers, and so on. The cultural context in which a game is designed and the impact of international distribution cannot be overlooked. Eastern and Western games tend to differ on many points, starting with the type of gameplay and fictions they propose. Accordingly, sound has to fulfill different tasks.

For a meaningful experience, audio must supply feedback on the game state and stimulate the gamer's listening strategies. In *PONG* (1972), the characteristic "ping" was used to indicate that the ball had rebounded off either the gamer's paddle or one of the horizontal walls delimiting the game's boundaries. While helping the gamer to better evaluate how to react in a given situation, it also provided a sense of rhythm to the game, making it more enjoyable. Most games require sound to fill similar functions, and in the extreme case of audio games, sound structures the whole gameplay experience.

Of course, not all video games are as abstract as *PONG*, *Tetris* (1985), or *Lumines* (2005); many take place in rich, vast, and complex virtual worlds. Consequently, researchers developed concepts and tools to analyze sound according to the specificities of the worlds found in video games. For her part, Kristine Jørgensen, following the ecological approach valued by Mark Grimshaw (2008), proposes the expression "gameworlds"; that is, "environments for play built around the logic of games" (Jørgensen 2017, 75). In such (acoustic) ecologies, sound becomes "an index of the interactions that happen in the environment" (75). In that respect, it must, on the one hand, render the acoustic traits of said gameworld, often making use of sonic effects simulating the properties of our physical reality—or those that gamers might expect from other types of representational mimetic spaces (i.e., the cine-real [see Collins 2008, 147] effects of a film diegesis). On the other hand, sound must perpetually communicate all the necessary information needed for the gamer's understanding and participation within the ecology, sometimes straying away from a more realistic depiction of the gameworld. This dual identity of gameworlds (ludic and fictional) lead Jørgensen to distinguish *ecological* sounds (that "are directly associated with the gameworld's ecology, and have a close verisimilitude to sounds in the physical world) from *emphatic* ones (which correspond to sound that "augment an event in the gameworld, and provide additional information compared to an ecological sound" [Jørgensen 2017, 79]). To be even more specific, sounds from both categories are dubbed as "fictionally motivated" if they tend to favor fictional coherence, while sounds that do not, often because they need to "clearly communicate gameplay mechanics or achieved goals" (80), are considered "ludically motivated."

Jørgensen's terminology, developed from an obvious and disclosed ecology-centric approach, underlines the fact that, while many video games present gameworlds, they all remain systemic and logical ludic spaces. However, this worldly bias fails to encompass (or at least forefront) games that mostly depict this latter type of space. This, of course, holds true for the abstract and purely systemic games previously mentioned and also for games that present a gameworld but in which said gameworld does not represent the foregrounded experience. In that respect, it should be acknowledged that the nature and composition of videoludic sound depend on the configurations by which these concurring spatial paradigms (ecological and logical) are layered and experienced and by the way in which they help structure listening.

Genre, understood here as a regulator of formal expression and expectations, then considerably influences a game's sonic aesthetic, particularly according to the conventions associated with the type of phenomenological space—whether logical or ecological—they traditionally aim to present. For example, in the fast-paced action sequences of first-person shooting games, sound must quickly provide information about the player character's surroundings, locating enemies and environmental hazards. Sound must therefore be designed to fulfill forewarning as well as spatial and localization functions (Grimshaw 2008). In survival horror games, sound is used to elicit fear and feelings of dread and uneasiness, and because fear is often induced through the unknown and the uncertain, sound design is conceived so the forewarning and localization functions of sound seem unreliable (Roux-Girard 2010).

Role-playing games (RPGs) do not rely as much on forewarning; for example, in games of the *Final Fantasy* and *Dragon Quest* series, combat is often kept separate from the exploratory sequences of gameplay and is triggered randomly. In turn-based games, gamers have more time to evaluate moves and plan attacks, and with the extended time frame, there is often a richer and more varied score; avoiding repetition is very important to maintain gamers' interest in the gameworld they explore. So, despite these discrepancies, first-person shooter (FPS), survival horror, and modern RPG games are nevertheless designed in a way that allows for the gamers to experience a sense of place, as if they were directly present or active within the gameworld. And it is according to those experiential ecological parameters that sound should be analyzed.

On the other hand, strategy games, such as those of the *Civilization* series, while still presenting some kind of gameworld, tend to stimulate listening strategies closer to the representation of a systemic, logical space—managed, rather than lived. In this sense, in such games, sounds should not be considered *ludically motivated* or *emphatic* as they simply aim, through the design of their effects, to stimulate a more semantic type of listening in the gamer. Sound is tailored to represent the relationships between the elements of the semantically coded space of the game first and the properties associated with the gameworld (as a place) second. In these circumstances, sound design depends less on how the world is architecturally structured and feels, but rather on what the sounds imply from a strategic standpoint. In other words, these games simply appeal to a more semantic—and less indexical—phenomenological listening paradigm than gameworld-oriented games.

Nevertheless—both in systemic and gameworld-oriented games—the sound aesthetic of video games is quite specific to the properties of the medium. Interactivity achieved through play is the distinctive feature that separates video games from other media. Consequently, the dynamic nature of video games considerably modifies the relationship gamers maintain with sound. As Karen Collins explains,

> Unlike the consumption of many other forms of media in which the audience is a more passive "receiver" of a sound signal, game players play an active role in the triggering of the sound events in the game. While they are still, in a sense, the receiver of the end sound signal, they are also partly the transmitter of that signal, playing an active role in the triggering and timing of these audio events. (Collins 2008, 3)

Indeed, listening to a video game is in many respects different from listening to a movie. For example, a game's listening point is almost always fixed within the perception of the player character or based on the distance between the player character and the virtual camera. Indeed, a listening point anchored within the subjectivity of a player character is essential to the interaction and identification between the player character and the gamers, facilitating the transmission of affects and emotions.

Interactivity also has a considerable impact on the construction of the on-screen and the acousmatic zones (off-screen and off), as defined by Michel Chion (1990). Whereas the location of sounds in film are determined and fixed by the director, in games, the circuit between on-screen and off-screen is significantly altered by the gamer's control of his or her player character and, consequently, of the game's virtual camera. Depending on the sound and context, the gamer may decide to go find the sound's source or avoid it. Sound designers must therefore strategically use sounds to properly stimulate gamers' listening strategies so as to simplify or complicate their decisions.

Of course, this does not imply that the sonic theory developed in music or film studies (or any other field) is irrelevant, but, rather, that it should be used with caution when it comes to games and only be used when applicable (i.e., in the case of gameworld-oriented games). Cinematic sequences in games, for instance, still make use of cinematic conventions. Also, although the relationship between the medium and the audience is considerably modified by interactivity, some of the connections between the images and sounds remain like that of film; they are tightly linked, producing an effect of *added value*. This is described by Michel Chion as a "sensory, informative, semantic, narrative, structural, or expressive value that a sound heard during a scene leads us to project on the image, creating the impression that we see in this image what in reality we 'audio-see'" (Chion 2003, 436, freely translated). However, the synchronization points responsible for this effect must establish a feeling of causality not only among the image, sounds, and game events but also between the actions performed by the gamer and those performed by the player character within the game's world. In video games, synchronization points are not only aesthetic but also pragmatic.

Also, in gameworld-oriented games, as in film, the rendering of the sounds must create the necessary degree of plausibility for the sound to seem "real, efficient, and adapted" to "recreate the sensation . . . associated to the cause or to the circumstance evoked in the [game]" (Chion 1990, 94, freely translated).

Overall, the many factors that influence a game's sonic aesthetic are not independent but must be understood as an interdependent whole. The sonic aesthetic of video games is ultimately tied to the properties of the medium and is the direct consequence of the different choices made in regard to the context in which a game is designed, toward creating the best possible video game experience.

Guillaume Roux-Girard

See also: Music; Sound Technology

Further Reading

Chion, Michel. *L'Audio-vision*. Paris: Nathan, 1990.

Chion, Michel. *Un Art sonore, le cinéma: Histoire, esthétique, poétique*. Paris: Cahiers du Cinéma, 2003.

Collins, Karen. *Game Sound: An Introduction to the History, Theory, and Practice of Video Game Music and Sound Design*. Cambridge, MA: MIT Press, 2008.

Grimshaw, Mark. *The Acoustic Ecology of the First-Person Shooter: The Player Experience of Sound in the First-Person Shooter Computer Game*. Saarbrücken, Germany: VDM Verlag, Dr. Muller Aktiengesellschaft & Co., 2008.

Jørgensen, Kristine. "Audio and Gameplay: An Analysis of PvP Battlegrounds in *World of Warcraft*." *Game Studies: The International Journal of Computer Game Research* 8, no. 2 (December 2008). Available at http://gamestudies.org/0802/articles/Jorgensen.

Jørgensen, Kristine. "Emphatic and Ecological Sounds in Gameworld Interfaces." In *The Routledge Companion to Screen Music and Sound*, edited by Miguel Mera, Ronald Sadoff, and Ben Winters, 72–84. New York and London: Routledge, 2017.

Roux-Girard, Guillaume. "Listening to Fear: A Study of Sound in Horror Computer Games." In *Game Sound Technology and Player Interaction: Concepts and Developments*, edited by Mark Grimshaw, 192–212. Hershey, PA: IGI Global, 2010.

Sound Technology

Sound technology in video games consists of both hardware and software. The sound hardware sets the limitations in terms of sound synthesis types, stereo and digital signal processing effects, and simultaneous channels, and the associated computer hardware (such as RAM) sets the limitations in terms of how this sound will function in real time in the context of the game and its associated requirements for memory. The software receives information from the game or its interface controls and sends calls to the hardware to activate the sound.

In the very early days of arcade sound technology, the hardware was analog, although this sound was typically controlled and manipulated digitally. Analog sound technology records and produces the electrical output of sound waves as they occur, whereas digital sound technology breaks the information down into binary digits and stores that numerical information so that it can later reproduce the sound.

Analog sound was generated using the speakers, which were "on-board," meaning they were attached directly to the motherboard. These would usually be piezoelectric or electromechanical speakers, colloquially referred to as "beepers," because a "beep" was about all they could handle. Piezoelectric speakers generated sound using a small diaphragm, which consisted of a small ceramic plate with electrodes on both sides attached to a metal plate. A DC voltage was applied between the electrodes on the diaphragm, causing a mechanical distortion and bending the diaphragm back and forth, creating a sound wave. Sound can therefore be generated by turning the piezoelectric speaker on and off in rapid succession, bending the diaphragm many times a second. An 11 kHz tone, for example, requires the speaker to be turned on and off eleven thousand times per second. Electromagnetic speakers worked in a similar way, using two magnets to create a repulsion and attraction, pushing and pulling the speaker cone, with the frequency and amplitude of the input wave dictating the rate and distance that the speaker voice coil moves and therefore the frequency of sound.

This sound-producing capability could be improved slightly by using what is known as *pulse width modulation*, which controlled the analog circuit with the digital computer timer. In other words, it was possible to digitally encode the analog sound through the use of high-resolution counters. Because the speaker could produce two sound levels (on and off), it was possible to carefully time the pulses of sound waves so that the speaker was left in the "off" position for a fraction of a millisecond, making it possible to emit sounds in between those two on/off levels and thereby increase the possible frequencies.

By the late 1970s, however, dedicated sound chips became incorporated into the hardware of video games. These sound chips have developed over time, incorporating a variety of synthesis technologies. The earliest dedicated sound chips were known as programmable sound generators (PSGs) and used subtractive synthesis, in which an oscillator creates a waveform and then uses a filter to subtract frequencies from that waveform until the desired frequencies remain. These waveforms were then passed through an envelope generator that would dictate the amplitude shape of the waveform. Many video game PSGs were created by Texas Instruments or General Instruments and contained three-tone generators and one noise generator. Some companies, such as Atari and Commodore, designed their own sound chips. The most popular was the AY-8910 series of General Instruments chips that found its way into a variety of home computers and game consoles, including the Sinclair ZX Spectrum, Amstrad CPC, Mattel Intellivision, Atari ST, and SEGA Master System.

By the arrival of 16-bit technology in the late 1980s, many companies were licensing Yamaha's Frequency Modulation (FM) synthesis chips, although many continued to also use PSG chips for sound effects, as with the SEGA Genesis, which used both an FM (the YM2612) and a PSG (Texas Instruments SN76489) sound chip. FM combined sound waves, using a modulating wave signal to change the pitch of a second sound wave. Many FM chips used four or six different oscillators for each sound to generate more complex sounds and realistic-sounding instruments. These chips found their way into many of the arcade games of the mid to late 1980s and most computer sound cards of the era.

Add-on third-party FM sound cards were developed in the mid-1980s, notably the AdLib Multimedia card in 1986. AdLib based its card on the nine-channel Yamaha FM chip, YM3812, which was a later version of the popular YM3526 used in many arcade games. Soon after the development of AdLib sound cards, Creative Technology (now Creative Labs) entered the market with its own sound cards, including Sound Blaster, essentially a copy of the AdLib card, using the same FM chip but with added digital audio capabilities for sampling and, most importantly, a game port. Sound Blaster quickly became the standard for game sound after a drop in price but was soon followed by a flood of sound cards entering the market. With such a variety, programming music for games became more problematic. By 1989, at the behest of Microsoft, Yamaha made its FM chips available on the open market so that a standard sound format for PCs could be created.

Also introduced in the 16-bit era, *wavetable synthesis* used preset digital samples of instruments (usually combined with basic waveforms of subtractive synthesis) and was therefore closer in sound to real instruments than FM synthesis. Wavetable synthesis formed the basis of the Sony SPC-700 sound chip in the Super Nintendo Entertainment System (SNES) and also found its way into Roland's popular MT-32 gaming and music sound card that was released in 1987.

By the early 1990s, most home computers had FM or wavetable sound cards supporting the Musical Instrument Digital Interface (MIDI) protocol. MIDI was a standardized data format for representing audio, which allowed game composers a simple way to create music and then provide programmers with the raw data dumps of that music. When CD-ROMs became popular in the early 1990s with the SEGA Saturn and Sony PlayStation, allowing for sampled audio, MIDI in games was for a large part abandoned in favor of more realistic but less dynamic music and sounds. Because the audio was not reliant on a sound card's synthesis, CD-ROM technology ensured that composers and sound designers could not only know how the audio would sound on most consumer configurations but could also now record sound effects, live instruments, vocals, and in-game dialogue. Most consoles still continued to offer MIDI support with dedicated sound chips.

The Nintendo 64 surpassed the PlayStation in technical capabilities in many respects. The main processor controlled the audio and was capable of producing 16-bit stereo sound at a slightly higher sample rate than CD quality (48 MHz). Digital signal processing (DSP) filters and effects, such as chorus, panning, and reverb, could also be implemented in the internal CPU, or in the software, in real time. Some games supported surround sound, and this was further enhanced by the third-party add-on release of the RumbleFx 3D Sound Amplifier, a device that could help to mimic surround sound on a stereo system. This surround capability was expanded on by the release of the Sony PlayStation 2 (PS2) in 2000, which supported surround sound standards AC3, DTS, and Dolby Digital, offering up to eight separate speaker channels. However, limitations still meant that sound quality had to be compressed to save space, with the result being that cutscene sequences typically had high-quality full surround sound, but when the player began to use other resources requiring real-time processing, the music and sound took second place and often dropped down to two-channel stereo.

Sound capabilities continue to increase in terms of access to RAM, 3-D surround technologies, DSP effects, and simultaneous audio channels. Increasingly, full orchestras are used for recording game music, and ongoing experimentation with algorithmically generative or procedural audio continues to expand the options that composers and sound designers have to create realistic yet dynamic audio.

Karen Collins

See also: Music; Sound

Further Reading

Campbell-Kelly, Martin. *From Airline Reservations to Sonic the Hedgehog: A History of the Software Industry*. Cambridge, MA: MIT Press, 2004.

Collins, Karen. *Game Sound: An Introduction to the History, Theory and Practice of Video Game Music and Sound Design*. Cambridge, MA: MIT Press, 2008.

Fay, Todd M., Scott Selfon, and Todor J. Fay. *DirectX 9 Audio Exposed: Interactive Audio Development*. Plano, TX: Wordware Publishing, 2004.

Land, Michael Z., and Peter N. McConnell. *Method and Apparatus for Dynamically Composing Music and Sound Effect Using a Computer Entertainment System*, US Patent #5,315,057, May 24, 1994.

Sanger, George. *The Fat Man on Game Audio: Tasty Morsels of Sonic Goodness*. Berkeley, CA: New Riders, 2003.

South Africa

Before the 1990s, only some hobbyist development was happening in South Africa, including the game *Blastar* (1984) for the Commodore VIC-20 by Elon Musk, of Tesla and SpaceX fame, who at the time lived in Pretoria.

Celestial Games was established in 1994 in Johannesburg by Nick McKenzie and Travis Bulford, and their first game, *Toxic Bunny* (1996) for PC, was published by local distributor Vision Software. The game shipped 150,000 units, allowing Celestial to work on a more ambitious title, the action role-playing game (RPG) *The Tainted* (2000), which sold about 5,000 units; however, the income was not enough to keep the company going, and it shut its doors in 2001. Celestial later reopened and produced an HD remaster of *Toxic Bunny* (2012) and is currently working on the *Table Realms* platform.

The late 1990s saw the arrival and growth of the SAGamedev.com website, a community site that allowed South African hobbyist game developers to share and showcase their work, with a particular focus on technology development.

In 1999, Dan Wagner, a South African–born graduate of Digipen Academy, founded I-Imagine Interactive in Johannesburg. He hired a number of U.S., Canadian, and South African developers to work for the company in

Johannesburg on the driving game *Chase: Hollywood Stunt Driver* (2002). I-Imagine was selected for the Xbox Incubator Program, and this helped *Chase* launch as an Xbox exclusive, published by Bam!, scoring 60 on Metacritic. I-Imagine's next titles were the PSP-exclusive *Final Armada* (2007), published by Virgin Play S.A. in Spain, and the trivia game *Football Genius* (2009) for Xbox 360 and PS3, with a Metacritic score of 61. I-Imagine ported a version of the game to iPhone in 2010.

After leaving I-Imagine, Matt Benic and Chris Tsimogiannis started Smallfry Mobile, a Johannesburg-based studio focused on J2ME titles. During 2004–7, the studio released a number of titles, including the shooting game *Abyss*, puzzle games *BrickLink* and *PlikPla*, and typing game *BBQT*, before closing.

Runestorm, a studio based in Kwazulu-Natal, was formed in 2005 by brothers Nolan, Arn, and Logan Richert to work on *Unreal Tournament* mods. Their first commercial title, *Rooks Keep* (2013), a melee arena combat game, launched on Steam. The highly successful simulation satire title *Viscera Cleanup Detail* (2015) entered early access the following year. Both titles were self-published.

Former I-Imagine staffer Diorgo Jonkers started Gojo Entertainment in 2005 in Grahamstown. Gojo's first game, the platformer *Demolish* (2001), launched for PC and was ported to J2ME devices in 2004. Games released under the Gojo banner included *Painty* (2006, PC), *Skeleton Coins* (2007, PC), *Pure Fun Soccer* (2012, iOS) and *Love Dodge* (2013, iOS). Gojo has also released assets on the Unity Asset Store.

In 2005, a new local development community, Game.Dev, was established as a subsection of the forums of the then successful local *NAG Magazine*, which primarily focused on game design rather than technology and was largely driven by local enthusiast Danny Day. Through themed competitions and accompanying segments in *NAG*, this community helped to grow South Africa's hobbyist community. It was augmented in 2006 with a regular online game development magazine, *Dev.Mag*.

Luke Lamothe, an I-Imagine veteran, started Luma Arcade in Johannesburg in partnership with the film effects company Luma Animation in 2007. The studio released advergames, including *Mini 37*, *Nokia Navigate around Town*, and *Ultimate Grand Prix Drive* for J2ME phones. A number of early commercial mobile titles for J2ME handsets included *Bun & Bunee: Island Hop*, and *Fashion Empire*. Garage Games published the online racing game *REV* as well as the iOS puzzle games *Marble Blast Ultra* and *Flipt*. The action RPG *The Harvest* (2010) was published for Windows Phone by Microsoft as a platform showcase title. The iOS and J2ME puzzle title *Monty Python's Cow Tossing* was published by Zed Group. Graphical showcase *Bladeslinger* (2012) was an action-adventure title for iOS and Android published by Kerosene games. After *Bladeslinger*'s release, Luma Arcade was absorbed into the San Francisco–based Beyond Games, though part of the team remains in South Africa and works on mobile titles.

In 2007, RetroEpic was formed in Cape Town by Niki and Keith Boshoff. The company released the turn-based puzzle game *A Day in the Woods* (2011, PC), and later ported it to mobile platforms. It provided technical services on third-party titles, including Every Single Soldiers' *Afghanistan '11* (2017) and *Carrier Deck* (2017). Other third-party titles included *Sharkie* (2012, iOS and Android), ZAC's *Batting Academy* (2014, iOS and Android), *Scorch Runner* (2015, iOS and

Android), *Jungle Beat* (2015, iOS and Android), and a digital version of *Flashpoint: Fire Rescue* (2018), a game from the company Indie Boards and Cards.

Former I-Imagine staffers Henk Bernhardt and Benjamin Duk started Open-Reset in 2007 and released a UDK demo of the platformer *Bounty Arms* (2011), which was completed in Unity for iOS and Android and published by Kerosene Games in 2012.

Cape Town–based indie studio QCF Design was started by Danny Day and Marc Luck in 2008. Its rogue-like *Spacehack* earned a place in the top 20 of the 2008 Dream-Build-Play competition, and the later rogue-like *Desktop Dungeons* (2013), designed by Rodain Joubert, won an award for Excellence in Design at the 2011 Independent Games Festival. The game launched to critical acclaim on Steam, followed later by iOS and Android ports. Its arcade title *Drawkanoid* (2019, PC) won the 2019 Nordic Game Discovery Contest. The studio has additionally created a number of educational and advergaming products.

Durban-based studio Lighthouse Games, founded in 2009 by Neil Jones and Edward Dennenkamp, has released many Xbox 360 titles, including *Fireplace* (2008; prior to formation), *myFishtank* (2009), *Avatar Rockets* (2009), *Avatar Cannon* (2010), *Super Tricky* (2010), *Tiny Tim's Tremendous Tank* (2010), *Prank Call* (2011), *Avatar Onslaught* (2011), *Monster Talk* (2011), *Trigger Finger* (2011), *Flirt* (2011), *Avatar Onslaught Blizzard* (2011), *Avatar Onslaught 2* (2012), *Avatar Deathmatch* (2012), *Comedy Night* (2012), *Prank Call 2* (2012), *Shark Attack Deathmatch* (2012), and *Avatar Deathmatch City* (2012). For Windows Phone, it released *Torchbear* (2011), *Greed City* (2013), *Zombie Warfare* (2014), *Russian Roulette* (2014), and *Tod the Talking Toad* (2015). Additionally, it released *Shark Attack Deathmatch 2* (2015, Steam), *Comedy Night* (2017, Steam), and *Challenge Stars* (2018, Android). The studio relocated to London in 2017.

Canadian immigrant Steve McIvor founded Tasty Poison in Cape Town in 2010 and released *Pocket RPG* (2011, Android and iOS), the puzzle game *Dig!* (2013, iOS, Android, and Ouya), and the multiplayer shooter *Neon Shadow* (2015). Tasty Poison also worked on a number of advergames and other partner projects.

Rising Phoenix Games was started by Rodney Sloan in Pretoria in 2010. While the company's main focus is tabletop RPGs, it has also released web games, including the text adventure *Rusty Blade* (2017) and the interactive visual novel *Dark Lily* (2017).

In 2011, Jason Reid returned to South Africa after stints at Disney and Eidos to start the augmented reality (AR)–focused studio Fuzzy Logic in George with cofounder Brad Hogan. The studio released a number of mobile titles, many of which are AR focused. Most of these were self-published: *Soccer Moves* (2013), *Secrets & Treasure* (2014), *Sketch Happens* (2018), and *#Tapgym* (2018). *Skylanders Collection Vault* (2014) was published by Activision.

Sea Monster, started in Cape Town in 2011 by Glenn Gillis and Wynand Groenewald, has established itself as a leading developer of serious games and advergaming products. Among these, in 2016, it self-published the first in its acclaimed *Super Animals Augmented Reality* series, which attracted over 1.5 million downloads.

Duncan Bell started the Johannesburg studio Red Dot Lab in 2011. It self-published the action game *Blazin' Aces* (2014) and mostly worked on free titles, including *Skadonk Showdown*. It also has a number of assets in the Unity Asset store and offers contract work to other local studios.

Free Lives, probably South Africa's best-known studio, was founded in Cape Town by Evan Greenwood in 2011. Its first game, *Broforce* (2015), was published to Steam by Devolver Digital after three years of open development, including time in Steam's Greenlight program. It was later ported to the PlayStation 4 (PS4) and Switch. *Broforce* is a side-scrolling run-and-gun platformer that features destructible environments and parodies of well-known action heroes. *Expendabros* (2014), a game made in partnership with Lionsgate for cross-promotional purposes, has the gameplay of *Broforce* but featured characters from the film *The Expendables 3* (2014). Finally, *Gorn* (2017) is a VR gladiator simulator released to Early Access on Steam by Devolver Digital.

In 2012, a new organization arose out of the success of the Game.Dev community and the need for better community organization and representation of the industry in general; Make Games South Africa (MGSA) had a web presence at makegamessa.com and took an active part in the running of local meetups. The initiative was spearheaded by community veterans Danny Day, Hanli Geyser, Jonathan Hau-Yoon, Andre Odendaal, and Ernest Young, along with intellectual property lawyer Nick Hall, who had begun to represent a number of local studios. The same year, the SAGamedev community site was taken down by its owners after disagreements with community members on what its role and focus should be.

Other studios appeared in 2012. Luke Lamothe, formerly of Luma Arcade, formed 24 Bit Games, a technical game development services company that offered porting, optimization, and other programming services to high-profile international clients such as Disney, Devolver Digital, and Unity as well as for many local studios. Pieter Loubser started Stellenbosch-based studio Inventit, which released a multiplayer strategy title, *Farm Wars* (2012), for the chat-and-app service Mxit. Durban-based indie studio Rogue Moon Studios was started by Gareth Fouche to make strategy games, including the cyberpunk-themed *CCG System Crash* (2016).

The year 2013 saw more industry expansion. Herman Tulleken and Jonathan Bailey started Gamelogic in Johannesburg, focusing on Unity Store code assets, including grids, words, colors, abstract strategy, and extensions; in 2014, Gamelogic got accepted into Startup Chile and relocated there. Simon Spreckley, David Moffatt, and Larry Katz started Thoopid in Cape Town, self-publishing *Snailboy: An Epic Adventure* (2013), *Tap the Coin* (2014), and *Snailboy: Rise of Hermitron* (2017). Every Single Soldier, a studio focused on abstract strategy titles, was started in Cape Town by Johan Nagel to realize his vision of a game that realistically represented the importance of the psychological aspects of warfare; *Vietnam '65* (2015), *Afghanistan '11* (2017), and *Carrier Deck* (2017) were all published by Slitherine. The Johannesburg studio Skobbejak Games was started by Tiaan Gerber and Alexander Ehlers, who self-published the first-person horror *Vapour* (2015), the first-person platformer *'n Verlore Verstand* (2016), the adventure game *Tyd wag vir Niemand* (2017), and the first-person shooter (FPS) *Geeste* (2018).

The Brotherhood was started in 2013 in Johannesburg by brothers Christopher and Nicolas Bischoff to make high fidelity adventure games. It relocated to Cape

Town in 2016. After a successful Kickstarter, *STASIS* (2013), its highly acclaimed first sci-fi horror-themed game, was self-published on PC in August 2015 and was followed by the similarly themed *CAYNE* in 2017. Originally formed in Durban by Matt Cavanagh in 2013 to create Windows Phone applications, Rogue Code went on to self-publish its top-down shooter *Vicious Attack Llama Apocalypse* on Xbox One and Steam in 2018.

David Mulder started Red Splat Games in 2014 in Port Elizabeth. The studio has since moved a few times, to Cape Town in 2015 and to Cradock in 2016. It self-published the puzzle game *Grey Matters* and tower defense title *Defender of Light* for Android in 2014. Its focus then shifted to Steam, on which it has published a number of titles, including the platformers *Eron* (2015) and HotFloor (2018); the racing game *Eight Mini Racers* (2016); the casual games *Vector Velocity* (2017), *Butterfly Moment* (2017), and *Not without My Poop* (2018); the puzzle games *Prime Shift* (2017) and *Paradox Wrench* (2018); and the shooting games *Smithy* (2016), *Burst* (2016), *Hover Hazard* (2016), *Bits n Bullets* (2017), *222* (2019), and *BUTCHERBOX* (2019).

Team Lazerbeam was started in Cape Town by Jason Sutherland, Richard Pieterse, and Ben Rausch in 2014. Its list of games, all self-published on PC, includes the simulation game *Bionic Bliss* (2014), the adventure game *Pizza Quest* (2015), and the dating simulation games *Wrestling with Emotions* (2016), *Dress to Express Dancing Success* (2016), *Snow Cones* (2015), and *Snow Cones 2* (2017). That same year, Twoplus Games was started in Johannesburg by Steven Tu. Its first game, the endless runner *Dead Run*, launched on iOS, Android, and Windows Phone in 2015. Francois van Niekerk, Leon van Niekerk and Hilgard Bell founded Clockwork Acorn in 2014. Its turn-based puzzler *Monsters & Medicine* was originally released in 2014 and was rereleased on Steam with an art update in 2017. *Luminare*, another puzzle game, was released in 2015 to mobile platforms.

In 2015, Cukia Kimani and Ben Myres started Nyamakop in Johannesburg. The studio's first game, *Semblance*, a puzzle platformer, was launched to Steam and Switch with publishers Good Shepard Entertainment in 2018. Also founded in 2015 was Orange Spice Games, started by Neil Moore, which has since self-published three puzzle games for Android, Windows Phone, and Windows Desktop: *Wordfix* (2016), *Sudomatik Mini Killer Sudoku* (2016; also released to Facebook), and *Ornamental Christmas Memory Game* (2016–19). Geoff Burrows started Zero Degrees Games in Johannesburg in 2015. The studio's first game, the first-person adventure *Among the Innocent: A Stricken Tale*, was self-published to Steam in 2017. In 2015, Alwynd Dippenaar self-published two action adventure titles, *FishGibble* and *Heroes Foe*, for Windows PC, Android, and iOS. In 2018, he started the company Goofish Game Studios in Johannesburg to release *FishGibble 2* for Windows PC, this time on Steam.

In 2016, Cape Town–based Balisti Studios was started as a spin-off from the animation studio Triggerfish Animation. Balisti offers cinematic and other art services to international game development clients. The projects it has contributed to include Bioware's *Anthem* (2019), Pixel Toy's *Warhammer Age of Sigmar: Realm War* (2018), Disney's *Baby Doc McStuffins* (2017), Nordeus's *Spellsouls: Duel of Legends* (2017), and other work for Unity. Output Games was started in 2016 in Johannesburg by Tyron Janse van Vuuren and Shayne Mann. The studio's puzzle-platformer *ECHOPLEX* was released on Steam in 2018.

Also in 2016, as it became apparent that MGSA could not simultaneously play the roles of community organization and industry representative body, Independent Entertainment South Africa was formed to focus on industry representation and advocacy. MGSA retained its role as South Africa's central community organization for professional, hobbyist, and student game developers. Under the leadership of Nick Hall, IESA has since facilitated numerous trade missions, represented industry interests in issues ranging from age ratings to funding, and organized the highly successful first annual Make Games Africa B2B conference in Cape Town in 2018.

In 2017, Sunelda van Zyl and Werner Olivier started PaleBlue XYZ in Pretoria. Its education puzzle game *Number Hunt* was self-published for PC VR in 2018. Marc Luck started Tangled Mess in 2017, after he and fellow QCF veterans Dorianne Dutrieux and Robbie Fraser created *Volantia* at the Stugan Games Accelerator. The game launched on Steam in 2018.

More new studios appeared in 2018. The Johannesburg studio Hubblegum was started by Ben Crooks and Andrea Hayes; its casual narrative game *Helping Hand* (codesigned with Aiden Cammell), about communicating by only using one-handed gestures, was self-published to Steam in 2018. Stephen Bester, Johnny Saleh, and Johan van Staden started Deep Space Digital and self-published its first game, *Spider Flush*, an infinite runner for Android and IOS. PAIN Games was started by Jaco Mostert, Raymond Beets, Karel Swanepoel, and Nico Kopf in Centurion, and its first game, the puzzle platformer *Gumstein: The Awakening*, was self-published to Steam in 2019.

With a growing number of studios and connections to the global industry, it seems that the South African video game industry will continue to flourish in the years ahead.

Matt Benic

See also: Africa

Further Reading

Bassey, Vic. "The Great Divide: A Look at Africa's Very Different Dev Scenes." Gamedindustry.biz, March 4, 2020. Available at https://www.gamesindustry.biz/articles/2020-03-04-the-great-divide-a-look-at-africas-very-different-dev-scenes.

Chan, Stephanie. "The IndieBeat: Why South African Game Developers Are Starting Their Own Industry Event." Venture Beat, April 19, 2018. Available at https://venturebeat.com/2018/04/19/the-indiebeat-why-south-african-game-developers-are-starting-their-own-industry-event/.

Diederichs, Wiehahn. "11 Games Putting South Africa on the Global Gaming Map." Gearburn, September 17, 2018. Available at https://memeburn.com/gearburn/2018/09/south-african-made-games/.

Garst, Aron. "The Struggles of South African Indie Game Development." *Variety*, March 19, 2019. Available at https://variety.com/2019/gaming/news/the-struggles-of-south-african-indie-game-development-1203166765/.

Snyders, Oliver. "The South African Game Development Scene: Past, Present, and

Future.” Gamasutra, August 3, 2009. Available at https://www.gamasutra.com/view/feature/132487/the_south_african_game_development_php.

Usmani, Basim. “The Game Industry of South Africa.” Polygon, February 3, 2016. Available at https://www.polygon.com/features/2016/2/3/10781618/the-game-industry-of-south-africa.

South America. *See* Argentina; Brazil; Chile; Colombia; Latin America; Uruguay

South Korea

Online gaming has been identified by the South Korean government as a national core industry to support. With the government’s strong backing, Korean online games have become one of the most globalized and lucrative sectors in Korean cultural industry. More than half of the South Korean population are online gamers. In the whole world, one can rarely find people more enthusiastic, committed, and professional about online gaming.

The success of Korean online games is no accident, and everything has worked out according to an official plan. South Korea used to be a consumption market for foreign games and has only become a major game exporter since about 2000. Until the ban on Japanese cultural products was overturned in 1998, Japanese games were popular in the Korea underground. Around this time, the Korean government promulgated the policy of building Korea into a cultural empire by providing investment and logistics support as well as policy and legal backup. Because of the problems of piracy and the dominance of Japanese games in most existing platforms, the Korean government and game manufacturers decided to focus on online game development.

In 1999, the Korean government established the Korea Game Development and Promotion Institute (now renamed the Korea Game Industry Agency), a semiofficial organization to provide strategic planning and support for the Korean game industry. It is actively involved in professional training, direct investment, technological development, game design, purchase of equipment, and overseas promotion.

The pace of Korean online game development has been astonishing. In less than a decade, South Korea has become an online game giant, exporting its products to every corner of the world. South Korea is itself a large consumption market for its own online games. The playing of online games is now a national pastime, with 35 percent of the entire population participating in online games. *Crazyracing Kartrider* (2004), an online car racing game, has been patronized by one-third of the entire population. Online game centers (called PC Bangs, in Korea) are everywhere, and their number is estimated at around thirty thousand, about six times more than that of convenience stores

Korean online games such as *Legend of Mir 2* (2001), *Lineage* (1998), and *Ragnarok Online* (2001) created a commotion in Asia. In July 2002, there were 500,000 simultaneous users playing *Legend of Mir 2*, and in 2004, *Lineage* had 350,000 simultaneous users at its peak. The game has 6 million users in Korea and more than 10 million users in the world. From 2008 to 2013, the Korean game market achieved double-digit growth. From 2014 onward, the market share of Korean games in Korea began to drop, as many Korean players have turned to play imported games such as *League of Legends* (2009), *Diablo III* (2012), and *FIFA Online 3* (2012).

The Korean government and game manufacturers have made online gaming a respectable profession. Game tournaments with enormous cash awards are organized to nourish professional game players in South Korea and to attract top-tier players from all over the world. Large-scale game tournaments are usually held in a stadium or concert hall. The most important one is World Cyber Games (WCG), the world's largest esports tournament, which has been held annually since 2000. In gaming circles, the winner of WCG is comparable to an Olympic gold medalist.

Professional game players are licensed by the Ministry of Culture and Tourism. National team members are national heroes and public icons. Seo Ji-hoon, the former WCG champion, is one such example; more than seven hundred thousand people have joined his fan club, outnumbering the fans of his counterparts in the singing or acting business. He makes appearances on TV programs and commercials as well as at public functions and was invited to visit Taiwan to see his fans there. To further enhance the status of professional game players, the Korean government revised its ordinances in 2006 to reduce or exempt them from national service. Nowadays, esports are big in South Korea and are ranked the third most popular youth sports, after soccer and baseball. "Faker" (real name: Lee Sang-hyeok), a top player of *League of Legends*, is a national icon. He is referred to as the "Michael Jordan of esports."

The Korean model, which puts emphasis on the role of government, has had a very strong impact in Asia. Mainland China, for instance, is adopting the same model to develop its online game industry. Today, South Korea is facing competition from new online game powers, such as Mainland China, Taiwan, the United States, and Japan. South Korea's market share overseas is shrinking; its market share in the online game market of Mainland China has dropped from 70 percent to 30 percent and in Taiwan from 80 percent to 40 percent. The future of Korean online games has challenges ahead.

Benjamin Wai-ming Ng

See also: Hong Kong; Piracy in China

Further Reading

Chung, Peichi. "South Korea." In *Video Games around the World,* edited by Mark J. P. Wolf, 495–520. Cambridge, MA: MIT Press, 2015.

Jin, Dal Yong. *Korea's Online Game Empire*. Cambridge, MA: MIT Press, 2010.

Jin, Dal Yong, and Florence Chee. "The Politics on Online Gaming." In *Gaming Cultures and Place in Asia-Pacific*, edited by Larissa Hjorth and Dean Chan, 19–38. New York: Routledge, 2009.

Park, Kyonghwan. "Internet Economy of Online Game Business in South Korea." In *Digital Economy: Impacts, Influences and Challenges*, edited by Harbhajan Kehal

and Varinder P. Singh, 286–312. Hershey, PA: Idea Group Publishing, 2005.

Space (Narrative)

Narrative space is an academic concept within video game studies for researching game space. The visual space (see Space [Visual]) in combination with narrative elements forms the narrative space. These narrative elements can be divided into three categories: narrative sequences, exploration, and mapping.

Narrative sequences form the main storyline of a game. This can be done in various ways, for example, through the use of cutscenes, dialogue, and quests. A *cutscene* is an animation that is meant to convey certain information to the player. It can be used as a tool to develop the plot of the main narrative of the game. Cutscenes mean a break in gameplay, whereas a *dialogue* forms a narrative sequence that can be used during gameplay. In *Grand Theft Auto IV* (2008), for example, players can still control their avatar while listening to dialogue that provides background information on the main storyline. Quests, as embedded in *World of Warcraft* (*WoW* [2004]), offer another way of presenting narrative information to players. A *quest* is a task given to a player who receives a reward upon finishing it successfully. Quests often form chains, meaning players start with one quest that, upon completion, is followed by another quest, thus forming storylines. Quests can also be used to guide players through the narrative of the game.

Exploration of a game's visual space by the player also forms an important narrative element of the narrative space. At the start of any game, players need to explore the space to learn how to progress and function within the world of the game. Exploration then entails the discovery of the game world but also the navigation of space. The ability to navigate through a space can create dramatic experiences (Murray 1998). A space that a player has visited then becomes a space where narrative events have taken place. Previous to the players' interference, the space could be defined as a *map*—an objectified spatial relation —and after the players' interference, it can be defined as a *tour* that represents the personalized journey through space (Newman 2004). An example of games in which exploration forms the narrative space can be found in shooting games such as *DOOM* (1993). In shooters, the game space is usually structured like a maze, wherein players have to navigate their way from one place to another. During their journey, they explore the space and create a narrative tour.

Players construct a mental map of the game while they piece together the narrative sequences and explore the space (Jenkins 2006). This mental map changes and adapts every time players come upon new information, and players consequently act on this mental map. The game space can then provide narrative descriptors (Salen and Zimmerman 2004) that will assist the players' process of mapping. Narrative descriptors are objects visually present within the game world that give a narrative explanation. Through their use, narrative information does not have to be given directly in exposition because players can draw their own conclusions and obtain information indirectly from the narrative space. Examples of the use of such narrative descriptors can be found in *Myst* (1993). In this game, players enter what appears to be an uninhabited game world in which they will have to gather clues to solve puzzles. At most locations, players can get a sense of what took place by reading the narrative descriptors, such as abandoned weapons that explain the intentions of the owners. Players then use the information from the narrative descriptors to adjust their mental map accordingly to function within the game world—for instance, by considering the weapons' owners as evil and performing actions against them.

Narrative sequences, exploration, and mapping are also interconnected. A game can open with a cutscene, and through this narrative sequence, the setting of the game is explained, from which players can base their process of mapping. Players then act on this map by exploring the space, during which they stumble on new narrative sequences that influence the mental map. The way narrative space is constructed often depends on the type of game. In first-person shooting games, the emphasis usually lies on the exploration of space, whereas in many role-playing games (RPGs), narrative sequences can predominate. Almost all types of games require mapping by the players.

In game design, space—and thus narrative space—plays an important role in the construction of the game world and the players' experience. Narrative space can give meaning to players' actions and provide them with more immersion and pleasure. Narrative space is often implicitly defined when mentioned in academic writing and is used in various ways that depend on the academic discipline using it; ludology, for example, focuses more on gameplay than narrative and thus would be more likely to examine exploration than narrative sequences. Even though there are a range of implicit concepts of narrative space used, there has been relatively little academic debate about the topic.

Judith Dormans

See also: Space (Visual)

Further Reading

Jenkins, Henry. "Game Design as Narrative Architecture." In *The Game Design Reader: A Rules of Play Anthology*, edited by Katie Salen and Eric Zimmerman, 670–689. Cambridge, MA: MIT Press, 2006.

Murray, Janet H. *Hamlet on the Holodeck: The Future of Narrative in Cyberspace*. Cambridge, MA: MIT Press, 1998.

Newman, James. *Videogames*. New York: Routledge, 2004.

Salen, Katie, and Eric Zimmerman. *Rules of Play: Game Design Fundamentals*. Cambridge, MA: MIT Press, 2004.

Space (Visual)

Because of their nature as visual media, video games always involve some sort of graphics, which are usually used to represent some form of visual space in which the games' events take place (see also Space [Narrative]) and may also include nondiegetic spaces such as high score screens or game instructions. Space in video games is different from that in film or television because of the interactivity available to the player, who is often able to determine which spaces are seen on-screen by moving the player character and its point of view. An examination of game space, then, should consider how spaces are represented, their dimensionality, their connectivity, and whether they require navigation.

At any given point in a game, its spaces are either on-screen or off-screen. On-screen spaces are those visible to the player (representing the player character's point of view or a third-person perspective of the player character) and are usually those in which players are active. Off-screen space is often implied by visible spaces that move on- and off-screen (as in games with scrolling); off-screen sounds, events, or information (e.g., in the radar scope in *Battlezone* [1980]); or with maps that reveal areas that the player has not yet seen. As in film, off-screen space is important in establishing a game world that is much larger than what appears on the screen, encouraging speculation and exploration.

Dimensionality refers to the fundamental structure of the space and may range from simple two-dimensional spaces that consist of a single game screen, like that of Atari's *Tank!* (1974); to so-called two-and-a-half-dimensional spaces made up of layers of independent but overlapping planes, as in *Super Mario Bros.* (1985); to games set in a computationally true three-dimensional space rendered in real time as the player character moves through it, as in *Tomb Raider* (1996) and *Halo 2* (2004). Some games simulate a third dimension through pre-rendered graphics (such as those using an axonometric perspective in *Zaxxon* [1982] and *SimCity 2000* [1993] or the first-person perspective imagery in *Myst* [1993]), lines or objects that suggest a first-person perspective (as in *Night Driver* [1976] and *Speed Freak* [1978]), scaling sprites that imply z-axis depth (as in *Pole Position* [1982] or *Space Harrier* [1985]), or objects redrawn in such a way that they appear to be turning in space (as in *Nebulus* [1987]). Other games using full-motion video (FMV) clips look three dimensional, such as *Star Trek: Borg* (1996), but as pre-rendered graphics, they allow little or no interaction.

Games can also have spaces of mixed dimensionality. Different levels of the same game can have different dimensionality; for example, in the three-stage shooting game *Tac/Scan* (1982), the first stage is two dimensional, similar to games such as *Galaxian* (1979) and *Space Invaders* (1978), but its second stage, "3-D Armada Attack," has players firing into the screen instead of up or down the screen. Mixed dimensionality can occur within a level as well, as in *DOOM* (1993) and *Super Paper Mario* (2007), in which two-dimensional characters and objects move through a three-dimensional space. Games can even play with the notion of dimensionality, as in *Echochrome* (2008), in which players rotate objects in three dimensions while reading them in two dimensions for the connections that the player character uses to make sense.

The spaces of games can also be non-Euclidean in nature. Even the simple, single-screen wraparound space of *Asteroids* (1979) represents the surface of a non-Euclidean 2-torus. Other games link screens in such a way as to make their space non-Euclidean (e.g., *Adventure* [1979]), and others are designed in such a way that two or more different spaces seem to occupy the same space, depending on how they are entered, as in *Duke Nukem* (1996) and *levelHead* (2007). Such games demonstrate the malleability of space available to the video game designer, who can connect spaces in ways that are nonintuitive and physically impossible.

Whether spaces are Euclidean depends on how they are connected to themselves or other spaces, and connectivity determines how spaces are structured. Connections between spaces can be indicated by the ability to move from one space to another, the ability to look into another adjacent space (as through a window), or by implication through the arrangement of spaces as on a map. Players often need to be able to identify which spaces are navigable by learning how to move and testing areas to see whether they can be entered. Even spaces a player character cannot enter can be important because the player may be able to influence events there—for example, by shooting (as in *Space Invaders*, where the player character is limited to moving across the bottom of the screen).

Finally, game spaces can be overlaid over physical spaces, as in games involving augmented reality (AR), such as *Ghostwire* (2008) or *Sky Siege* (2009), which position game elements virtually in the space around the player, who must turn around and use a mobile device as a window to see what is occurring in the game. Pattern recognition and motion detection software will allow more AR games to become available on systems with built-in cameras, such as the Nintendo DSi, the PlayStation Move, and the Kinect for the Microsoft Xbox 360.

Space, or the implication of space, must precede temporality and narrative because both require events, and events require space. Thus, our awareness of space in a game comes before the temporal and narrative aspects (unless these are acquired through materials outside of the game itself, as is often the case). Spatial design usually gives the player some sense of the temporal and narrative structures of a game as well. These can be expanded through both innovative software and hardware designs that experiment with the representation, manipulation, and navigation of space. Questions regarding the design of video game spaces, how those spaces are connected, and how they are experienced are essential to video game studies and the study of the human experience of spatial representations in general.

Mark J. P. Wolf

See also: Dimensionality; Space (Narrative)

Further Reading

Nitsche, Michael. *Video Game Spaces: Image, Play, and Structure in 3D Worlds*. Cambridge, MA: MIT Press, 2009.

Wagner, Mark. *The Geometries of Visual Space*. Mahwah, NJ: Lawrence Erlbaum Associates, 2006.

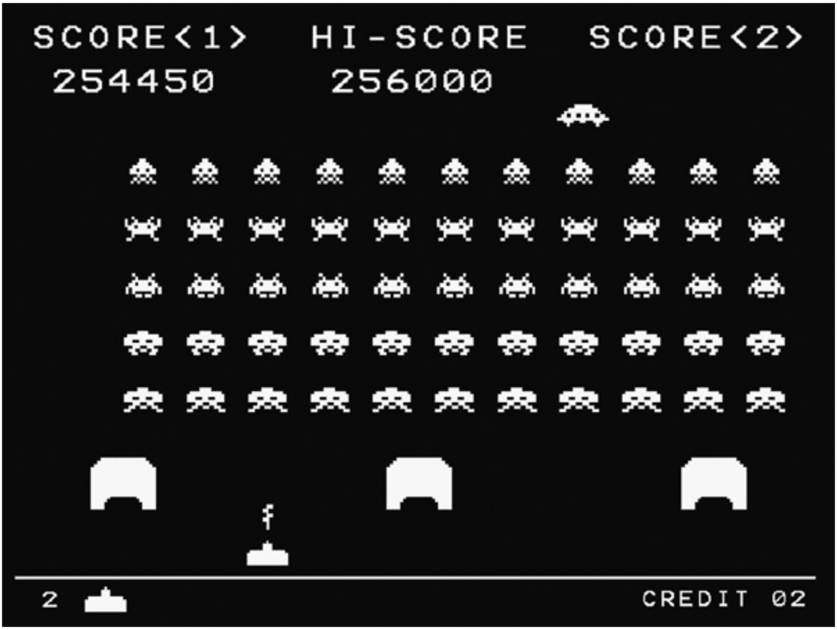
Wolf, Mark J. P. "Space in the Video Game." In *The Medium of the Video Game*, edited by Mark J. P. Wolf, 52–75. Austin: University of Texas Press, 2001.

Wolf, Mark J. P. "Theorizing Navigable Space in Video Games." In *Logic and Structure of the Computer Game*, edited by Stephan Günzel, Michael Liebe, and Dieter Mersch, 36–62. Potsdam, Germany: Potsdam University Press, 2010.

Wolf, Mark J. P. "Z-Axis Development in the Video Game." In *The Video Game Theory Reader 2*, edited by Bernard Perron and Mark J. P. Wolf, 151–168. New York: Routledge, 2008.

Space Invaders

Designed and programmed by engineer Toshihiro Nishikado, *Space Invaders* (1978) was the first arcade game released by Taito, the popular pachinko machine manufacturer. Interestingly, *Space Invaders* originated from an evaluation tool to test computer programmers' skill with hexadecimal mathematics and was inspired by Nishikado's love for the film *Star Wars* (1977), H. G. Wells's novel *The War of the Worlds* (1898) and the subsequent 1938 Orson Welles radio adaption, and Apple cofounders Steve Wozniak and Steve Jobs's *Breakout* (1976) game published by Atari. Because it was politically incorrect to harm humans in games at the time, the army onslaught was replaced with alien aggressors looking for global domination. Despite a lukewarm response from company executives, the game emerged and was released to little fanfare, at least initially.



A screenshot from the original version of Taito's *Space Invaders*, released in the arcade in 1978. (Courtesy of Mark J. P. Wolf)

After a few months, however, *Space Invaders* became so popular in Japan that it caused a shortage of the 100 yen coin—the coin needed to play the game. This shortage affected several other aspects of Japanese life, including the heavy disruption of the primary form of transportation, the subway. *Space Invaders* had brought Japan to its knees, and the government was literally forced to quadruple the production of the yen coin to meet the new demand.

Because of its intensifying popularity, entire arcades were opened in Japan specifically for *Space Invaders*, many of which held dozens of *Space Invaders* games and no others. As hysteria concerning the game mounted, a number of shop owners abandoned their goods and converted their stores to video arcades, some complete with booming audio systems broadcasting the thumping march of the invaders into the streets. With the ever-growing demand, other venues started hosting coin-operated machines, and *Space Invaders* had found a habitat everywhere—from pizza parlors, restaurants, and bars to drugstores, laundry mats, roller rinks, grocery stores, and even such unlikely locales as funeral homes.

Before *Space Invaders*, a good run for a coin-op release was a few thousand machines. For *Space Invaders*, a staggering five hundred thousand–plus coin-op machines were sold worldwide in the first year, 70 percent of which remained in Japan. In time, more than one hundred thousand *Space Invaders* games had been distributed, and more than three hundred thousand were built (if counterfeit versions are included). Billions of coins were pumped into the machines for the first few years, amassing more than $500 million in revenue for Taito, making the entire entertainment industry sit up and take notice.

A large portion of these coins came from teenagers eager to play. Unfortunately, many of them engaged in theft, robbery, and panhandling to acquire coins to get their fix. As a result, these inappropriate actions led to the first of what would become a trend of public outcries against the video game industry. In the United States, groups of concerned parents and government organizations that feared games tainted the minds of schoolchildren worked their case to ban the machines all the way up to the U.S. Supreme Court (DeMaria and Wilson 2002, 46).

The concept behind *Space Invaders* was simple in design; it was an adaptation of carnival shooting galleries. The player would guide a laser cannon located on the bottom of the screen from left to right to shoot down wave after wave of marching alien raiders. The laser cannon could hide behind four bunkers that served as obstructions, defending the laser cannon from the aliens' rays and bombs. The bunkers, and the player-controlled laser cannon, would eventually be destroyed by the relentless alien invasion that slowly advanced from the top of the screen to the bottom. On occasion, an alien spaceship, which could be shot down for bonus points, would fly across the top of the screen.

One factor that added to the hopeless tension created while playing the game was the increasing speed of the game as more invaders were destroyed. The aliens moved faster and faster, and the audio, reminiscent of the thumping sound of a beating heart, became more rapid during their descent. Although many identify this rapid increase as one of the greatest game design scenarios of all time, it was a result of hardware technicalities and not of intentional devising or fancy programming; the processor was able to update the screen more frequently as the number of enemies decreased. This resulted in the ramped-up speed of the aliens and the soundtrack.

Midway licensed *Space Invaders* from Taito and released the game in the United States. Although it did not create a quarter shortage, it was unparalleled in popularity. In a good location, the game could pay for itself in less than a month, placing video games among the most lucrative equipment a merchant could possess.

Atari, the American company with a Japanese name, recognized the opportunity and licensed the game for release on the Atari VCS 2600 console. Whereas *PONG* (1972) was the first coin-op game to appear in the home in the form of a stand-alone unit, *Space Invaders* was the first video arcade game to be adapted to a home console on a physical interchangeable cartridge. The VCS release of *Space Invaders* was also historical because it was the first game to be licensed by another company and adapted for play on a home console. The VCS conversion also expanded on the coin-op version by offering 255 different gameplay variations. Atari even focused its advertising budget and marketing efforts to sell *Space Invaders* instead of the VCS console itself. As a result, sales of the VCS spiked, and *Space Invaders* became the first "killer app" (a must-have application that causes many people to buy a new system).

The Atari VCS 2600 had been released in 1977, but it was not until 1980, when consumers purchased the console with an accompanying copy of *Space Invaders*, that Atari's unit sales skyrocketed. The company began to empty its warehouse and the excess stock of four hundred thousand units (Herman 1994, 38). Demand had become so high that the VCS had to be rationed out to retailers, and manufacturing production had to be stepped up. In addition to the system sales, the game sales of Atari's home version of *Space Invaders* grossed more than $100 million for Atari (Santulli 2002, 72); Atari's combined gross income reached $415 million. As a result, Atari's gross income more than doubled, leading its operating income to rocket to a third of its parent company, Warner Communications. This in turn caused the stock to rise 35 percent, resulting in Atari becoming the fastest-growing company in history (Herman 1994, 43).

The crude sprite graphics of *Space Invaders*, although simplistic by today's standards, were groundbreaking at the time. The alien aggressors were the first characters to have individual animation while moving horizontally and vertically within the playing field. The creatures have also become icons for the industry and are widely recognized symbols of video gaming. *Space Invaders* is among the most influential video games ever created and took the world by storm, contributing to a video game craze that continues to this day.

Michael Thomasson

See also: Arcade Games

Further Reading

DeMaria, Rusel, and Johnny L. Wilson. *High Score: The Illustrated History of Electronic Games*. Berkeley, CA: McGraw-Hill/Osborne, 2002.

Herman, Leonard. *Phoenix IV: The History of the Videogame Industry*. Springfield, NJ: Rolenta Press, 2017. First edition 1994.

"History of Space Invaders." Classic Gaming, 2019. Available at http://www.classicgaming.cc/classics/space-invaders/history.

Santulli, Joe. *Digital Press: Classic Video Games Collector Guide v7.0*. Clifton, NJ: Digital Press, 2002.

Spacewar!

Spacewar! is a two-player space combat game originally created for the DEC PDP-1 minicomputer. Written during the winter of 1961–62 by a group of students at the Massachusetts Institute of Technology (MIT), it is one of the earliest known graphical computer games.

The game was first conceived by J. Martin Graetz, Stephen Russell, and Wayne Witanen. Strongly inspired by contemporary science fiction cinema and the space opera novels of E. E. Smith, it was designed as a "hack" to demonstrate the capabilities of the computer and its cathode-ray tube (CRT) screen. The development began in December 1961. The core program was written by Stephen Russell, with assistance from Robert Saunders. The initial version was completed by February 1962. The game featured two spaceships, each with a limited supply of fuel and missiles. Using the switches on the computer's front panel to control rotation, thrust, and fire, the players attempted to destroy their opponent's ship. The combat was rendered across a randomly generated star field and limited to a single wraparound screen (objects traveling beyond the edges of the screen immediately reentered on the opposite side, at the same angle and velocity).

With basic gameplay in place, the hacker community thriving around the MIT computer lab immediately proceeded to introduce various modifications to the program. Peter Samson integrated his *Expensive Planetarium* into the game, replacing the random background with a realistic representation of the night sky as seen from Cambridge, Massachusetts. Dan Edwards introduced a central star with a surrounding gravity well, putting the ships at constant risk of being pulled in and destroyed. This increased the overall difficulty of the game and introduced an element of strategy into gameplay, as skilled players were able to use the gravitational pull to gain speed and perform advanced maneuvers. Finally, Graetz added the "hyperspace jump"—a chance to escape perilous situations by warping the ship to a random destination on the screen. The game was finalized by April 1962.

Although the earliest known attempts to create a computer game date back to the early 1950s, *Spacewar!* differs from these early attempts in two significant respects. The earlier efforts typically consisted of adapting traditional strategy games (such as chess, nim, or tic-tac-toe) for computer play and were tied to unique, custom-built machines. In contrast, *Spacewar!* was designed from the ground up as a computer game and developed for a standardized hardware platform. With approximately fifty PDP-1 units in existence, the game was able to circulate (free of charge) between commercial and academic computing centers across the United States, gaining widespread popularity. It was also often modified and ported to other systems.

In the early 1970s, *Spacewar!* provided the template for the first coin-operated video game machines: *Galaxy Game* (1971), the earliest known coin-op video game, and *Computer Space* (1971), the first mass-produced arcade video game. The latter was designed by Nolan Bushnell and Ted Dabney, of Syzygy Engineering (incorporated the following year as Atari, Inc.), and distributed by Nutting Associates. The first arcade game utilizing vector graphics, Cinematronics' *Space Wars* (1977), was also a *Spacewar!* clone.

P. Konrad Budziszewski

See also: *Computer Space*; *Galaxy Game*

Further Reading

Brand, Stewart. "*Spacewar*: Fanatic Life and Symbolic Death among the Computer Bums." *Rolling Stone*, December 7, 1972: 50–58.

Graetz, J. Martin. "The Origin of *Spacewar*." *Creative Computing,* August 1981: 56–67.

Levy, Steven. "Spacewar." In *Hackers: Heroes of the Computer Revolution*, 37–57. Garden City, NY: Anchor Press/Doubleday, 1984.

Spain

Although Spain's arcade game production during the 1970s amounted to only a few electromechanical games, such as *Monza* (1977) and *Rally Cross* (1977), by the mid-1980s, Spanish software finally emerged from the cave. This splendid period (1983–89), known as "the golden age," arose through the efforts of a group of young freelance programmers who founded and established, for the first time in Spain, a rich ensemble of software companies, including Opera Soft, Indescomp, Made in Spain, Dinamic, Topo Soft, Zigurat, and Aventuras AD. Most of their games were developed for the ZX Spectrum Sinclair, the MSX, and the Amstrand CPC. In terms of turnover, the Spanish video game industry became the second most important in Europe during the late 1980s, surpassed only by the United Kingdom. Spain's international success was due to games such as Indescomp's *Bugaboo* (1983), Topo Soft's *Survivor* (1987), and Dinamic's *Navy Moves* (1988).

The man who epitomized this golden age of Spanish software was Francisco "Paco" Menéndez (1965–99), unanimously considered the best Spanish video game creator. Menéndez began his creative career with the adventure game *Fred* (1983) at Indescomp and its sequel, *Sir Fred* (1986), at Made in Spain, the latter being one of the most innovative games of that year. For his first solo project, Menéndez conceived of an ambitious unauthorized adaptation of Umberto Eco's celebrated novel *The Name of the Rose* (1980). Influenced by the games created by the Stamper brothers for Ultimate (especially *Knight Lore*[1984] and *Pentagram* [1986]), the game, eventually named *La Abadía del Crimen* (1988), is a deep and complex adventure, gorgeously designed by Menéndez and his collaborator, Juan Delcán. The game was a milestone and is still considered the best Spanish video game ever created and one of the best games of all time for 8-bit machines.

In the 1990s, however, the Spanish video game industry collapsed. The companies were unable to adapt their production standards toward 16-bit platforms and succumbed. Only Dinamic survived, thanks to its *PC Futbol* franchise of football management simulation games, which were massively successful in Spain. Another exception was Gaelco, one of the few Spanish companies to emerge during the 1990s, which specialized in arcade games such as *Radical Bikers* (1998). Meanwhile, Bit Managers surfaced, developing a number of Infogrames titles, such as *Asterix & Obelix* (1995) for the Super Nintendo

Entertainment System (SNES). The most successful Spanish game of the decade, however, was the remarkable *Commandos* (1999) by Pyro Studios, a real-time tactical game conceived by Gonzo Suárez, a distinguished and veteran creator who debuted in Opera Soft during the golden age (in fact, *Commandos* is explicitly dedicated to the memory of his friend Paco Menéndez, who passed away that same year).

After another lost decade (of the 2000s), two new Spanish companies now occupy the center of attention: Akaoni Studio, whose *Zombie Panic in Wonderland* (2010) for WiiWare became the most downloaded game in Japan, and Mercury Steam Studio, with its excellent *Castlevania: Lords of Shadow* (2010), published by Konami for the Microsoft Xbox 360 and the Sony PlayStation 3 (PS3) and supervised and supported by the great Hideo Kojima. Perhaps these developments herald the coming of a new golden age.

Alberto Flores del Río

Further Reading

Canal Plus Docs. "La Edad de Oro del Soft Español." TV program, 1999.

Portalo Calero, Francisco. *Bugaboo, un Hito en la Historia del Software Español*. Universidad de Extremadura, 2010.

Rodríguez Larrañaga, Pedro José. "Spanish Software: Breve Historia del Software Español." *Micromanía*, 1990–1991: 204–206.

Spatial Navigation. *See* Navigation (Spatial)

Spector, Warren (1955–)

Warren Spector is a designer of role-playing games (RPGs) and computer games. He is notable for his work on the game *System Shock* (1994) and the *Ultima*, *Wing Commander*, *Thief*, and *Deus Ex* game franchises. He holds a bachelor's degree in communications from Northwest University, Illinois, and a master's in television, film, and radio from the University of Texas in Austin. Spector is married to fantasy writer Caroline L. Spector.

Spector began his professional career as a college professor. After teaching several undergraduate courses at the University of Texas and working a stint as an archivist at the Harry Ransom Center, he was offered a position at *Space Gamer Magazine*. In 1983, Spector was initially employed as an editor for the magazine but soon became the editor-in-chief of the company that owned the magazine, Steve Jackson Games. Spector began creating RPGs for Steve Jackson Games, his most noteworthy title being *Toon* (1984), a cartoon RPG that parodies many of the conventions of more standardized tabletop RPGs.

In 1987, Spector was hired by TSR Inc., where he helped develop titles such as Top Secret/S.I. (1987) and Spelljammer (1989), a Dungeons & Dragons campaign that features an outer space environment. He also cowrote a novel for TSR titled *Double Agent: The Royal Pain/The Hollow Earth Affair* (1988).

Shortly after his work with TSR, Spector entered the computer game industry.

Working with game developers Origin Systems, Looking Glass Studios, and Electronic Arts (EA), Spector helped develop many popular software titles. Spector's game credits include *Wing Commander* (1990), *Wing Commander: The Secret Missions* (1990), *Ultima VI: The False Prophet* (1990), *Bad Blood* (1990), *Wing Commander II: Vengeance of the Kilrathi* (1991), *Wing Commander: The Secret Missions 2: Crusade* (1991), *Ultima: Worlds of Adventure 2: Martian Dreams* (1991), *Ultima Underworld: The Stygian Abyss* (1992), *ShadowCaster* (1993), *Ultima Underworld II: Labyrinth of Worlds* (1993), *Wing Commander Privateer: Righteous Fire* (1993), *Ultima VII: Part Two: Serpent Isle* (1993), *Ultima VII: Part Two: The Silver Seed* (1993), *Wings of Glory* (1993), *System Shock* (1994), *CyberMage: Darklight Awakening* (1995), *Crusader: No Remorse* (1995), and *Thief: The Dark Project* (1998). Spector is known to include cameos of his likeness in the games he works on.

In 1997, Spector founded the Austin branch of Ion Storm Inc. While there, he developed the titles *Deux Ex* (2000), *Deus Ex: Invisible War* (2003), and *Thief: Deadly Shadows* (2004). He departed Ion Storm in 2004 to establish a new company, Junction Point Studios, which was acquired by Disney Interactive Studios in 2007. Spector's first project with Disney Interactive was *Epic Mickey* (2010), a steampunk-inspired title developed exclusively for the Nintendo Wii. This was followed by a sequel, *Epic Mickey 2: The Power of Two*, in 2012. In 2013, Junction Point Studios was closed, and Spector departed Disney Interactive.

In 2016, Spector joined Otherside Entertainment, a studio founded by Looking Glass cofounder Paul Neurath. Spector currently heads the company's Austin, Texas, studio and has assisted with development on *Underworld Ascendant* (2018) and the upcoming *System Shock 3*.

Aaron D. Boothroyd

See also: Electronic Arts

Further Reading

Otherside Entertainment website. Accessed October 2, 2020. Available at https://otherside-e.com/wp/.

Speedruns

A speedrun is a popular method of game replay in which the goal is to achieve the quickest possible completion. While some categories focus on completing 100 percent of a game's content, others have different objectives: finishing the game with minimal collecting of items, using specific characters, or using bugs in the game to reach an end state far more quickly than the developer intended. Speedruns emerged from gaming communities as alternative modes of competitive play but have evolved to include cooperative modes in which players work together, sometimes with multiple players on a single controller.

The rapid replay is meant to showcase a player's skill and memorization of a game environment, proving gaming prowess through a record speed finish. This mode took place in some early gameplaying (e.g., *Quake* [1996]), but it is most visibly featured and shared on online video sites such as YouTube and Twitch with the help of recording software and software emulators. Speedrun races and tournaments are built on a competitive foundation: players are forced to make rapid decisions that are also safe enough to prevent any lost time to their rivals if mistakes are made. Beyond individual player status and community rivalry, speedruns reveal game mechanics and their software complexity, as the technique subverts intended game paths and gameplay.

With classic games, speedruns function without evolving artificial intelligence (AI) or programmed computer enemies and environments—both of which are outside early technical softwares' abilities—making memorization easier to achieve. Games relying on repetition rather than randomization allow players to replay for speed rather than experience. Skilled speedrun players analyze game environments and their memory while playing. As a result, they can frequently identify how player actions impact the random number generator of a given game, allowing for personal control over elements that seem difficult to account for otherwise. Randomizer modifications in video games (such as *The Legend of Zelda: A Link to the Past* [1991]) change the locations of items, bosses, and entrances, requiring players to use their knowledge of a game's mechanics to solve an entirely distinct version of the game.

With more contemporary games, players begin performing speedruns shortly after a title's release, but must constantly adapt their gameplay to changes created by developers via software patches and updates. Overall, speedruns can expose the replayability of certain games as well as the inability of others to offer alternate replay experiences, depending on how quickly players can complete their speedruns. The speedrun replay creates an alternate path to game completion that is meant to act as a challenge. Therefore, the speedrun operates differently from other replay modes to preserve play while relaying game mechanics and strategies to fellow players.

Racquel M. Gonzales and Andrew Borman

See also: Replay and Repetition

Further Reading

Busby, James. "The Best Speedruns You'll Ever See." GamesRadar+, March 9, 2020. Available at https://www.gamesradar.com/best-speedruns/.

Spirituality

Spirituality is a broad category that generally refers to the personal experience of a religious tradition or other sacred phenomenon. Put another way, spirituality tends to emphasize the subjective qualities—such as feeling, attitude, perception, and value—that arise from an encounter with the transcendent. In some cases, video games attempt to simulate or facilitate a form of spiritual experience.

The interdisciplinary study of spirituality emerged as an academic pursuit throughout the twentieth century and into the twenty-first century. In 1902, William James suggested that religious (or spiritual) experience was heterogeneous, expressing itself in a rich variety of emotions and behaviors as a response to the mystical and transcendental. Later, Rudolf Otto described spiritual experience in terms of the "numinous"—a nonrational sense of fascination and awe, of solemnity and longing that manifests itself in an encounter with the "wholly other" (Otto [1923] 1958; cf. Jung 1938). In a 1999 meta-analysis, researchers suggested that spirituality could best be understood as the integration of traditional religious categories with personal and social phenomena (Zinnbauer, Pargament, and Scott 1999). Oman (2013) notes that, although spirituality is hard to define, multidisciplinary approaches to understanding spirituality seem to affirm a "search process" for the sacred, with an inherent capacity for self-transcendence on the part of the one who searches.

Interestingly, early technology theorists suppose that computer technology may foster an experience of self-transcendence. Norbert Wiener (1966) suggests that self-transcendence is a by-product of creating various forms of artificial life. Bruce Mazlish (1993, 195) concurs, suggesting that the quest for self-transcendence through the creation of computer technologies and simulated worlds appears to be "one of humanity's deepest aspirations." Michael Heim notes that virtual reality (VR) can set the stage for "an experience of the sublime or awesome" (1993, 137). He links this experience with *eros*—"a drive to extend our finite being" and "to heighten the intensity of our lives" (87).

Some video game theorists and researchers suggest in passing that video games may be able to foster a form of spiritual experience. For example, James Paul Gee suggests that video games may be good for the "soul." He identifies the soul with "our emotions and imagination" (Gee 2005, 7) and theorizes that video games possess the capacity to feed the soul with meaning and significance along the way to human growth and development (119). Edward Castronova argues that "synthetic worlds" present players with transcendent vistas that evoke a sense of longing, mediate a sense of sublimity, and inspire a sense of reverence (2005, 106–112; Castronova 2007, 206–207). Christopher Scholtz (2004, 2005) speculates that video games may evoke an experience of joy and fascination that compares favorably to spiritual experience. Kutter Callaway (2010) imagines that video game play through systems such as the Nintendo Wii may facilitate a form of experiential integration—sensual, somatic, affective, and holistic—that supports spiritual experience.

Richard Garriott's *Ultima IV: Quest of the Avatar* (1985) stands as one of the earliest attempts at integrating spirituality with video game design. In *Ultima IV*, the player seeks moral perfection on a spiritual quest to save the world. In fact, "spirituality" is one of the eight virtues that the Avatar must contemplate and practice. Although Garriott remarks at one point that *Ultima IV*'s aims are philosophical, not religious (Addams 1990, 40–42), elsewhere he remarks that the player is the "spiritual essence" of the avatar (Herz 1997, 157) and that spirituality, religion, morality, and ethics lend "credibility and completeness" to game worlds (Bub 2002).

Other historic examples exist in which video game designers experiment with in-game spirituality. Peter Molyneux designed *Populous* (1989)—an ancestor of many "god games" to come—as a playful simulation of divine-human relations.

Wisdom Tree Games published a series of religious video games for the Nintendo Entertainment System (NES), including *Bible Adventures* (1991) and *Spiritual Warfare* (1992). Rand and Robyn Miller created *Myst* (1993) and its sequels as an aesthetic expression of their Christian faith and worldview (Swain 2010). The work of Tracy Fullerton (2005) at the Electronic Arts Game Innovation Lab at the University of Southern California seeks to construct a procedural rhetoric of spiritual perception—particularly contemplation and mystical experience. In contrast, the real-time strategy (RTS) game *Left Behind: Eternal Forces* (2006) attempts to construct a procedural rhetoric of spiritual indoctrination from a fundamentalist perspective.

Patrick Slattery ([1992] 1999, 2006) suggests that spiritual experience is often mediated through a proleptic moment—a moment in time when personal awareness of the past and future powerfully converge in the present, overwhelming the subject with insight and revelation. A few current video games effectively utilize the proleptic moment as a means of simulating and facilitating spiritual experience for the player. Drew Davidson's *Well Played 1.0: Video Games, Value and Meaning* (2009) recounts a wide range of autobiographical narratives in which players occasionally describe the power of in-game proleptic moments—moments when time, meaning, and contemplation converge. In this regard, the player narratives about *Mines of Minos* (1982), *Shadow of the Colossus* (2005), and *Passage* (2007) bear particular weight. The platform game *Braid* (2008) also structures a proleptic moment through its narrative and ludological qualities.

Some video game designers seek to incorporate mechanics, aesthetics, or the wisdom traditions of spirituality in video game play to facilitate meditation and relaxation. For example, *Journey to Wild Divine* (2003) uses biofeedback fingertip monitors to assist players into contemplative peace throughout gameplay, while *Guru Meditation* (2009) uses either the Amiga Joyboard or iPhone accelerometer to monitor "legitimate zen meditation" (Bogost 2009). The publisher Thatgamecompany designs games with visual and sound elements that inspire feelings of awe, wonder, and other heightened emotions often associated with spiritual experience: *flOw* (2006), *Flower* (2009), *Journey* (2012), and *Sky: Children of the Light* (2019). *Never Alone* (2014) mediates an immersive exploration of indigenous ecospirituality within the context of an Alaskan Inupiat wisdom tradition. In contrast, *That Dragon, Cancer* (2016) presents a humbling, existential experience of self-limitation in the face of unanswerable questions about human suffering within the context of a Christian wisdom tradition. As Douglas E. Cowan (2019) writes, "Like all forms of complex storytelling and storyworld creation, videogames are a way for us to engage with questions of meaning, purpose, identity, . . . teleology[,] . . . suffering, [and] justice—we have tended to call these *religious* questions when they are more properly human questions" (107–108). Toys and games do not lie outside the scope of spiritual concern (Bado-Fralick and Sachs Norris 2010). To the contrary, they can act as material gateways to spiritual searches for meaning and self-transcendence.

Mark Hayse

See also: Contemplative Games

Further Reading

Addams, Shay. *The Official Book of Ultima*. Radnor, PA: COMPUTE Books, 1990.

Bado-Fralick, Nikki, and Rebecca Sachs Norris. *Toying with God: The World of Religious Games and Dolls*. Waco, TX: Baylor University Press, 2010.

Benson, Peter L., et al. *Hardwired to Connect: The New Scientific Case for Authoritative Communities*. Commission on Children at Risk. New York: YMCA of the USA, Dartmouth Medical School, Institute for American Values, 2003. Executive summary available at http://americanvalues.org/catalog/pdfs/hwexsumm.pdf.

Bogost, Ian. "Guru Meditation." Weblog, 2009. Available at http://www.bogost.com/games/guru_meditation.shtml.

Bub, Andrew S. "Game with God." *Computer Games Magazine*, May 2002. Available at http://www.gamingwithchildren.com/2008-06-23/retro-game-with-god/#more-632.

Callaway, Kutter. "Wii Are In*spirit*ed: The Transformation of Home Video Consoles (and Us)." In *Halos and Avatars: Playing Video Games with God*, edited by Craig Detweiler, 75–88. Louisville, KY: Westminster John Knox, 2010.

Castronova, Edward. *Exodus to the Virtual World: How Online Fun Is Changing Reality*. New York: Palgrave Macmillan, 2007.

Castronova, Edward. *Synthetic Worlds: The Business and Culture of Online Games*. Chicago: University of Chicago Press, 2005.

Cowan, Douglas E. "'Crap, We Needed a God . . .': Religion, Videogames, and the Digital Social." In *The Digital Social: Religion and Belief*, edited by Alphia Possamai-Inesedy and Alan Nixon, 93–109. Berlin, Germany: Walter de Gruyter, 2019.

Davidson, Drew, et al. *Well Played 1.0: Video Games, Value and Meaning*. Pittsburgh, PA: ETC Press, 2009. Available at http://www.etc.cmu.edu/etcpress/wellplayed1.0.

Fullerton, Tracy. "The Potential of Play: Game Innovation, Expression and Learning." Paper presented at Microsoft Research, December 2005. Available at https://newsvideo.su/tech/video/146939.

Gee, James Paul. *Why Video Games Are Good for Your Soul: Pleasure and Learning*. Altona, Australia: Common Ground Publishing, 2005.

Heim, Michael. *The Metaphysics of Virtual Reality*. Oxford, UK: Oxford University Press, 1993.

Herz, J. C. *Joystick Nation: How Videogames Ate Our Quarters, Won Our Hearts, and Rewired Our Minds*. New York: Little, Brown, and Company, 1997.

James, William. *The Varieties of Religious Experience*. New York: Library of America, 2009 [1902].

Jung, Carl Gustav. *Psychology and Religion*. New Haven, CT: Yale University Press, 1938.

Mazlish, Bruce. *The Fourth Discontinuity: The Co-Evolution of Humans and Machines*. New Haven, CT: Yale University Press, 1993.

Newberg, Andrew, Eugene D'Aquili, and Vince Rause. *Why God Won't Go Away: Brain Science and the Biology of Belief*. New York: Ballantine Books, 2001.

Oman, Doug. “Defining Religion and Spirituality.” In *Handbook of the Psychology of Religion and Spirituality*, edited by Raymond F. Paloutzian and Crystal L. Park, 23–47. New York: Guilford Press, 2013.

Otto, Rudolf. *The Idea of the Holy*. Oxford, UK: Oxford University Press, 1958 [1923].

Scholtz, Christopher P. “Fascinating Technology: Computer Games as an Issue for Religious Education.” *British Journal of Religious Education* 27, no. 2 (March 2005): 173–184.

Scholtz, Christopher P. “Religious Education and the Challenge of Computer Games: Research Perspectives on a New Issue.” In *Towards a European Perspective on Religious Education*, edited by Rune Larsson and Caroline Gustavsson, 256–267. Stockholm, Sweden: Artos & Norma, 2004.

Slattery, Patrick. *Curriculum Development in the Postmodern Era*. 2nd ed. New York: Routledge, 2006.

Slattery, Patrick. “Toward an Eschatological Curriculum Theory.” In *Contemporary Curriculum Discourses: Twenty Years of JCT*, edited by William F. Pinar, 278–288. New York: Peter Lang, 1999 [1992].

Swain, Lisa. “*Myst* and *Halo*: A Conversation with Rand Miller and Marty O’Donnell.” In *Halos and Avatars: Playing Video Games with God*, edited by Craig Detweiler, 91–107. Louisville, KY: Westminster John Knox, 2010.

Wiener, Norbert. *God and Golem, Inc.: A Comment on Certain Points Where Cybernetics Impinges on Religion*. Cambridge, MA: MIT Press, 1966.

Zinnbauer, Brian J., Kenneth I. Pargament, and Allie B. Scott. “The Emerging Meanings of Religiousness and Spirituality: Problems and Prospects.” *Journal of Personality* 67, no. 6 (1999): 889–919.

Sports Games

Sports games are one of the most popular types of video game on the market. A *sports game* may be defined as a game attempting to simulate an activity akin to real world sport. Different sports games will simulate sport in different ways and in varying degrees of realism, but all sports games provide some approximation of sport to the players. Sports games have also played an important role in the history of video games.

HISTORY

Some consider a simulation loosely based on sport, Willy Higginbotham’s *Tennis for Two* (1958), to be the very first video game. Like *Tennis for Two*, many of the oldest sports games enabled gamers to bring their experience of real-world sport to the simplistic graphics of these early games. Sport provided an easy way to make sense of blocky pixels bouncing around the screen. In 1966, Ralph Baer began creating a ping-pong-like game for use with a television, and he invented a hockey game for television one year later. In 1972, Nolan Bushnell adapted Baer’s game into *PONG*, the first widely played sports game and video game, and many other imitations appeared in the home game market. Other early sports game titles included *World Cup Football* (1974), *Grand Track 10* (1974), and *Grand Track 20* (1974). Atari's *Football* (1978) was among the first games with two-way scrolling and helped popularize the trackball controller mechanism.

During the 1980s, sports games were released for home consoles, such as the Atari VCS 2600 and the Mattel Intellivision, and for computers, such as the Commodore 64, Amiga, Apple II, and the IBM PC. Varying television-style camera angles debuted during this period with *World Series Baseball* (1982) for the Intellivision. In a push to make sports games more realistic, sports game developers struck licensing deals with professional athletes, teams, and sports organizations. Some sports game developers consulted coaches and placed them on their covers to promote and legitimize their games as viable simulations. Examples of these games include *Earl Weaver Baseball* (1987) and *John Madden Football* (1988) from Electronic Arts (EA).

In 1993, EA established a unit exclusively devoted to sports games, EA Sports. Since then, EA Sports has created and published some of the most successful video game franchises ever. These franchises include the *NBA Live* basketball series, the *FIFA* soccer series, the *NHL* hockey series, the *Tiger Woods PGA Golf* series, and, most famously, the *Madden Football* series. Although other sports game developers had created games stressing realistic statistics, player physics, and graphics, EA Sports oriented its entire marketing and development focus around a commitment to realism in every area of its simulations. EA Sports also began the practice of releasing a new version of a sports game with the opening of each real-world sports season. Over the course of its history, EA Sports has published games based on auto racing, baseball, rugby, cricket, Australian rules football, boxing, tennis, and personal training.

Although other companies competed with EA Sports throughout the 1990s and into the twenty-first century, Take Two Interactive's daughter company, 2K Sports, and first-party companies such as Sony and Nintendo presently exist as its primary competition. 2K Sports and Sony have created games that rival EA Sports, and Nintendo has used its Wii motion controller to promote its popular *Wii Sports*.

GAME TYPES

The sports game genre can be divided into various subcategories that lie on a simulation continuum. Games that attempt to realistically simulate outcomes exist at one end, and games that have little interest in realistic outcomes are at the other (Conway 2007).

The first category of sports games features those that attempt to simulate the outcomes of real-world sport to the greatest degree. Conway (2007) calls these games "management simulations." Typically, players call these types of sports games "text sims" (short for "simulations") and predominantly play them on a personal computer. They are often geared toward players who want to manage or coach a team rather than control its players. As a result, the text sim emphasizes strategy and planning more than quick reflexes. The *text sim* label has been applied to this type of game because much, if not all, of a given game's action occurs via text. The player does not see his or her team move around a virtual field or stadium. Instead, the player reads the outcome of a specific play in game reports or learns what has occurred through statistical information. This statistical information serves as the key focus of the text sim.

Text sims strive to achieve realistic statistical outcomes. As such, the computer's power is dedicated to complex calculations to generate plausible results. Recent titles in this subcategory of sports games have begun to integrate simple graphical representations of in-game action, but many text sims still leave these graphics out of gameplay. Because they do not emphasize graphics that require large development teams, these games are often developed independently by individuals or small studios. Examples of text sims include the *Football Manager* series, the *Out of the Park Baseball* series, and the *Front Office Football* series.

At the opposite end of the spectrum are a subcategory of sports games that make no attempt to achieve realistic statistical outcomes. Conway (2007) labels these games "extreme simulations." Extreme simulations are predominantly played on home consoles. They are intended for the player who has little or no interest in whether a virtual athlete performs at the same level in the game as in real life. In contrast to text sims, these games are not concerned about accurately simulating games, seasons, or careers. Instead, extreme simulations emphasize a fast pace and exaggerate the most exciting elements of the sports they represent. As players control their teams, the athletes in these games can perform actions they could never perform in real-world sports. One of the first widely popular extreme simulations was the arcade hit *NBA Jam* (1993) from Midway Games. The most prominent publisher in this category is EA Sports Big. Examples of games in this category include the *NBA Street* basketball series, *The Bigs* baseball series, and the *SSX* snowboarding series.

In between these two extremes of dedicated statistical realism and little, if any, focus on believable outcomes are those sports games that attempt to simulate real-world sports but allow the player to directly influence results. Conway (2007) calls these types of games "action simulations." Action simulations are most often played on home consoles but are also played on personal computers. They are intended for players who want to take control of their favorite teams and athletes to see if they can do better than their squad's real-world performance. Like management simulations, these games aim for statistical plausibility. Like extreme simulations, these games allow for players to control the athletes on the screen. However, games in this category differ by providing a middle ground between realistic statistical outcomes and the actions players can control on-screen. Unlike management simulations, action simulations do not demand realistic statistical outcomes. Unlike extreme simulations, action simulations do not allow players to move in physically unrealistic ways. As a result, these types of sports games provide a middle ground between the other two categories through detailed graphical realism that replicates the nuances of stadiums as well as athletes' appearance, equipment choices, and athletic movement. In action simulation games, players see something similar to what they would see while watching a sporting event on television. Examples of action simulations include the *Madden Football* series, the *FIFA Football* series, and the *NBA 2K* series.

The most recent trend to find its way into sports games, irrespective of subgenre, concerns card-collecting modes. The mode first appeared in EA's *Champions League* football game in 2006–7, but it has since spread to games across the genre. Players open digital packs to acquire virtual player cards reminiscent of their cardboard predecessors. These packs can be acquired by preordering titles, playing the game, or by direct purchase. Most cards feature an athlete, a coach, a stadium, or a sport-specific power-up. Players subsequently collect cards and create their own teams that they can use to compete off-line or online. These modes have been incredibly profitable. In the 2017 fiscal year, EA reported that its version of the mode, *Ultimate Team*, produced almost a fifth of the entire company's total revenue (Ballard 2017).

LICENSES

One of the most important issues in the history of the sports game has been that of licenses. Professional sports leagues and organizations recognized that additional revenue could be gained from sports video games and subsequently began selling licenses to game developers. Game developers realized that sports game players would be more likely to purchase games featuring real teams and athletes. These licenses allowed developers to use real team names and logos and the names and likenesses of real players.

The first licensed sports game appeared in 1983 with the release of EA's basketball title, *Dr. J and Larry Bird Go One on One*. Over the course of the next twenty years, licensing became quite commonplace. However, in 2004, the licensing landscape changed considerably. Throughout the late summer and early fall of 2004, rival game publishers 2K and EA Sports fought a battle for consumer loyalty over their football titles. 2K's *ESPN NFL 2K5* (2004) competed against EA Sports' *Madden Football 2005* (2004). 2K had sold its game for $19.99, well below that of EA's offering. *ESPN NFL 2K5* sold well enough that it began to bite into EA's considerable *Madden* customer base. On December 13, 2004, EA announced that it had signed an exclusive five-year deal with the National Football League, making EA the only company that would be allowed to produce football games featuring NFL teams, logos, stadiums, and players. On February 12, 2008, EA extended the agreement through the 2012 season. Although EA had negotiated exclusive deals with other less popular professional sports organizations before, the magnitude of this agreement was a watershed in sports game history.

In 2005, rival publisher, Take Two, struck a similar deal with Major League Baseball (MLB) that provided Take Two with exclusive rights to MLB and its associated properties. This agreement did allow console makers to develop MLB games, but it prevented other developers and publishers (like EA) from making games using professional players and teams.

To take advantage of these exclusive deals, sports game developers have increasingly begun to release licensed titles in each of the three subgenres previously outlined. For example, after EA Sports' agreement with the NFL, the company not only continued publishing the action simulation *Madden Football* but also developed the extreme simulation *NFL Street* and the management simulation *NFL Head Coach*. In a similar way, 2K expanded its action simulation *MLB 2K* baseball series into the extreme simulation *The Bigs*, and the management simulation *MLB Front Office Manager*. With the advent of lucrative card-collecting modes in action simulation games, the extreme and management simulation subgenres have been dropped by mainstream publishers.

These exclusive licensing deals were not welcomed by all. In 2009, lawsuits were filed against EA and the National Collegiate Athletics Association (NCAA) by former Arizona State quarterback Sam Keller and UCLA basketball player Ed O'Bannon. Keller and O'Bannon charged the company with failing to compensate collegiate athletes for using their likenesses in the company's games (Associated Press 2009; Nocera 2016). EA eventually settled the cases by compensating twenty-nine thousand former college athletes from a pool of $60 million. College sports games have disappeared, with many attributing the disappearance to these cases. Some gamers have also had problems with these exclusive licensing deals. Less than six months after EA extended its agreement with the NFL, two gamers filed a class action lawsuit against the company, charging it with anticompetitive activity (Sinclair 2008).

Andrew Baerg

See also: Esports; *FIFA* Series; Football Games

Further Reading

Adams, D. "Take-Two MLB Deal Official: We Already Knew, but Now It's Stamped and Sealed." IGN, January 24, 2005. Available at http://sports.ign.com/articles/582/582293p1.html.

Associated Press. "Keller Sues EA Sports over Images." ESPN, May 8, 2009. Available at http://sports.espn.go.com/ncf/news/story?id=4151071.

Ballard, J. "Here's How Digital Revenue Has Benefitted Electronic Arts." The Motley Fool, September 9, 2017. Available at https://www.fool.com/investing/2017/09/09/heres-how-digital-revenue-has-benefited-electronic.aspx.

Conway, S. "Systems of Winning: The Sport Simulation." In *Digital Games: Theory and Design: Proceedings of the 2007 Conference Held at Brunel University*. London: Brunel University, 2007.

Leonard, D. "An Untapped Field: Exploring the World of Virtual Sports Gaming." In *Handbook of Sports Media*, edited by Arthur A. Raney and Jennings Bryant, 393–407. Mahwah, NJ: Lawrence Erlbaum Associates, 2006.

Nocera, J. "O'Bannon Ruling Stands, but N.C.A.A.'s Status Quo May Yet Collapse." *New York Times*, October 3, 2016. Available at https://www.nytimes.com/2016/10/04/sports/ncaa-obannon-case-ruling-supreme-court.html.

Sinclair, B. "Gamers Sue EA over Football Exclusivity." GameSpot, June 13, 2008. Available at http://www.gamespot.com/news/6192409.html.

Surrette, T., and C. Feldman. "Big Deal: EA and NFL Ink Exclusive Licensing Agreement." GameSpot, January 24, 2005. Available at http://www.gamespot.com/articles/big-deal-ea-and-nfl-ink-exclusive-licensing-agreement/1100-6114977/.

Thorson, T. “EA Sports Extends NFL Deal through 2012 Season.” GameSpot, February 12, 2008. Available at http://www.gamespot.com/news/6185880.html.

Square Enix

Square Enix is a Japanese video game developer, publisher, and distributor with several large titles in its arsenal of games, including the *Tomb Raider*, *Final Fantasy,* and *Dragon Quest* series of games. The company came into being through the merger of Enix and Square, two Japanese video game companies. Enix was a video game publishing company started by Yasuhiro Fukishima in 1975, and Square was a game design company started in 1983 by Masafaumi Miyamoto; the two companies initially worked together to design and publish the *Dragon Quest* series. Both companies were among the largest video game developers in the 1990s, and in 2000, they began to discuss a merger, though it was postponed for several years due to Square’s first feature film, *Final Fantasy: The Spirits Within* (2001), which flopped, losing close to $82 million.

After the turnover of several higher-ups at Square, including Tomoyuki Takechi as chairman and Hironobu Sakaguchi as executive vice president, Yoichi Wada stepped in as CEO in December 2000 and ultimately became responsible for paving the way for the merger. Under Wada’s guidance, Square recovered financially between the failure of *Final Fantasy: The Spirits Within* and the merger with the release of *Kingdom Hearts* in 2002. In April 2003, Square and Enix finally became one company under the name of Square Enix. Wada became the new president of the company, and Enix’s president, Keiji Honda, became the vice president. Square was ultimately dissolved in the merger, and Enix became the remaining company.

After the merger, Square Enix began to acquire a number of companies, both gaming-related and non-gaming-related, including Taito, creator of *Space Invaders* (1978), and Eidos Interactive, publisher of the *Tomb Raider* series. In 2008, the corporation became known as Square Enix Holdings, with subsidiary companies responsible for developing and publishing still under the name Square Enix.

Square Enix has continued to create content for different gaming platforms and media outlets, a strategy that Square Enix’s European division’s president has called a “polymorphic” move. The company has focused on producing video games for all of the major gaming platforms available, and it also does game development for handheld gaming devices. Its most popular works include the *Final Fantasy*, *Dragon Quest*, *Tomb Raider*, and *Call of Duty* series.

Ashley P. Jones

See also: *Call of Duty* Series

Further Reading

Square Enix website. Accessed October 2, 2020. Available at https://www.square-enix.com/.

StarCraft

StarCraft is a real-time strategy (RTS) computer game designed by Chris Metzen and James Phinney, developed by Blizzard Entertainment, and released March 31, 1998. Its expansion, *Brood War*, came out in November of that same year. The *StarCraft* universe further expanded in novels and mangas, and a sequel, *StarCraft II*, came out in three parts: *Wings of Liberty* (2010), *Heart of the Swarm* (2013), and *Legacy of the Void* (2015). The *Remastered* version of the game was released in 2018. It used the same game engine but supported wider resolutions, more detailed 2-D graphics and sound, new cutscenes, and a matchmaking and ladder system similar to modern strategy games. The original game, along with its expansion, became free-to-play (F2P) the same day the *Remastered* version was released.

While it was a new step in the RTS genre for Blizzard after the success of *Warcraft II: Tides of Darkness* (1995), *StarCraft* has a science fiction setting: three species are fighting each other in a sector of the galaxy. The Terrans are humans, redneck criminals exiled from Earth a long time ago. The Zergs are giant insect-like creatures of various forms morphed from larvae and controlled by a central brain. The Protoss are thin aliens that gain their power from psychic capabilities and robotic technologies. Each species is not only fighting the others; there are also internal struggles within each species for different interests in the galaxy.

The game follows most of the genre's conventions and is considered a leading example of a balanced asymmetrical RTS. Players must establish a base and collect resources (minerals and vespene gas) to build military units and lead their armies into combat. The game uses a mouse and keyboard as controllers, and players click on units and buildings to issue orders, which are carried out automatically. Units and buildings have different characteristics (hit points, attack score, armor, etc.) and special abilities that influence the results of combat. Each power-up in the game is ordered in a *tech tree*: in addition to an amount of resources needed, the construction of certain buildings is a prerequisite for new units, buildings, technologies, and upgrades. Collecting resources implies that the player constructs and defends new bases all over the map. The Zerg must erect most of their buildings on the *creep* (a living superorganism) that their Hatcheries secrete, while the Protoss must construct Pylons and build around them. Standard games are over when a player (or a team of allied players) destroys all of his or her opponents' buildings.

Workers: 18/18
4:40

A person playing *StarCraft II* at a gaming convention. (Pp1/Dreamstime.com)

The narrative consists of six single-player campaigns; three in the original game and three more with the expansion. Each campaign is an episode of the whole storyline and allows the player to gain control of a specific faction (Terran, Zerg, or Protoss). The player has to fulfill the objectives of a scenario to move on to the next objectives, which could be as diverse as "survive for 30 minutes," "bring a unit to a specific location," or simply "destroy the enemy camp."

The first drafts of the game were very similar to Blizzard Entertainment's precedent work in the RTS genre, *Warcraft II: Tides of Darkness* (1995). In 1998, *StarCraft* still used two-dimensional graphics, even though other RTSs had already begun using three-dimensional graphics in 1997 (such as *Age of Empires* and *Total Annihilation*), and it borrowed many gameplay elements from its predecessors. Nonetheless, *StarCraft* raised the standards in several ways.

First, as in the already established *Command & Conquer* series, the story is delivered through deep character development and impressive voice acting. At the time, most storylines in RTSs were given between scenarios—sometimes as text only—and could easily be skipped without losing the overall feeling of the game. However, at the core of its narrative and campaign gameplay, *StarCraft* features "heroes" who are characters as well as in-game units; these heroes talk to the player and to each other between the scenarios and during the game, resulting in gaming sequences that are more involved in the campaign narrative.

Second, *StarCraft* is considered one of the most balanced multiplayer RTS games, meaning that the unique characteristics of each faction do not give them advantages over the other factions. This balance is asymmetrical: each of the three races has a different set of units, buildings, technologies, and special abilities, as opposed to most RTS games of the time that had identical or very similar factions. Twenty years after the original release, the three races are still balanced, and the number of patches needed to maintain this balance is surprisingly low, especially compared to today's standard in competitive games—including the *StarCraft II* installments.

Third, in terms of gameplay, the importance of speed and micromanagement is one of *StarCraft*'s defining characteristics. Players have to balance their actions between macromanagement and micromanagement: an economic or technological advantage will usually ensure victory in the long term, but unit control is an important factor in combat and is essential for most of the special abilities. Speed is crucial to competitive play; professional gamers have to play at around three hundred actions per minutes or more. Strategies relying on execution skills are something derogatorily dubbed "cheese"; the infamous "Zerg Rush"—a fast attack with Zerglings, the cheapest unit of the Zerg faction—being one of the most common examples of cheese.

Moreover, the *StarCraft* "campaign editor" had functionalities that made it possible for players to create scenarios where the rules of the game are changed. The Battle.net server, Blizzard Entertainment's gaming network, hosted custom games with special rules that changed the gaming experience. For example, the map "Aeon of Strife" contained the main features of the multiplayer online battle arena (MOBA) genre, such as a lane-based map and heroes gaining upgrades and skills; many maps popularized the tower defense genre. Other players preferred the "ladder" side of the multiplayer games, a mode using only a set of approved maps, where the game keeps score of the players' results. Although Blizzard did not support a ladder system for *StarCraft* for more than a decade before the release of the *Remastered* version, elite players could still challenge each other within a similar system through third-party servers, such as ICCup.com.

What makes *StarCraft* unique, though, is the fact that it gained the status of an esport and saw the emergence of a professional gaming scene in South Korea at the turn of the millennium. *StarCraft* was nationally regulated via the Korea e-Sports Association (KeSPA) founded by the South Korean government. Television channels broadcast hosted leagues, such as the Ongamenet Starleague (OSL) and the MBCGame Starleague (MSL). South Korean companies sponsored professional teams—for example, Samsung KHAN and SK Telecom T1—and *StarCraft* pro gamers were the first cyber athletes to be celebrities. Although other games are played in competitions all over the world, *StarCraft* is one of the first and most long-lasting of them and has been a part of the World Cyber Games since its beginning in 2000.

If the RTS is sometimes thought to be a genre in stagnation, *StarCraft* was released at the pinnacle of its golden age. Even though other RTSs have a certain audience in the professional gaming scene, *StarCraft* already has a place in video game history for its exemplary use of the conventions of the genre and for having held gamers' and spectators' interest for more than two decades.

Simon Dor

See also: Strategy Games

Further Reading

Geryk, Bruce. "A History of Real-Time Strategy Games, Part I: 1989–1998." Game

Spot, March 4, 2001. Available at http://www.gamespot.com/gamespot/features/all/real_time (site discontined).

Team Liquid. "StarCraft Pro Gaming News." Accessed October 2, 2020. Available at http://www.teamliquid.com.

Stealth Games

Stealth is a gameplay style that involves sneaking, subterfuge, and secrecy as opposed to direct engagement. The main player activity usually involves navigating an avatar around an environment full of dangerous opponents, all of whom are initially unaware of the player's presence. The player attempts to maintain this secrecy for as long as possible while being engaged in other activities. What these activities are depends greatly on the game, but common ones include theft, sabotage, escape, and assassination. The ease with which these goals are achieved can often be strategically adjusted by eliminating opponents. The most typical form of elimination involves sneaking up behind opponents to subdue them, often referred to as a "stealth kill" or "stealth takedown," depending on whether the move is lethal or nonlethal.

If the player makes a mistake and is discovered, gameplay usually switches to some sort of action-based schema involving gunplay or melee combat. Depending on the game, the player's avatar may be weak in combat or strong, making the penalty for mistakes very different. In some games, the only course of action in the event of being discovered is flight. In others, it may be possible to take out all opponents in a head-on confrontation. The avatar's combat prowess often determines to what extent stealth is a necessity or a choice, making the centrality of stealth to a game's generic identity somewhat flexible.

A game can emphasize stealth as a major style of play, a minor style of play, or on equal footing with direct confrontation. Some games emphasize stealth as a major style of play, even with a combat-ready avatar, by punishing the player for being seen by means other than death (such as a bad "stealth rating" or loss of resources). The natural rhythms of stealth gameplay are essentially the sustained tensions of a game of hide-and-seek, with long periods of silence and secrecy punctuated by quick bouts of frantic action.

The history of stealth in games may be described differently depending on whether one is talking about stealth as a gameplay style or stealth as a genre. Stealth as a gameplay style appeared to a lesser or greater degree in many games before it became recognized as a genre, and it still crops up in games even when the genre is not exclusively stealth. The earliest example of stealth gameplay is arguably *Castle Wolfenstein* (1981), a top-down shooting game in which it was advantageous to shoot Nazis from behind. *Metal Gear* (1987) is another, more complicated example of early stealth gameplay, with a fully developed military espionage setting that gives context and coherence to its gameplay. Because of *Metal Gear*'s great emphasis on stealth (sneaking was not just the best strategy but the only strategy), it has been retroactively labeled a stealth game by some, even though the term was never applied to *Metal Gear* by its own makers. The third *Metal Gear* game, *Metal Gear Solid* (1998), coined the term "tactical espionage action” in reference to the fact that the gameplay alternated between sneaking and spectacular action set pieces. This combination kept *Metal Gear*’s relationship to the emerging stealth genre ambiguous, even though it pioneered much of the genre’s foundational concepts.

Other games emerging around the same time as *Metal Gear*, such as *Thief: The Dark Project* (1998), *Tenchu: Stealth Assassins* (1998), *Commandos: Behind Enemy Lines* (1998), and *Hitman: Codename 47* (2000), were more visibly laying the groundwork for stealth as a genre, given that they relied almost completely on sneaking and offered far more brutal consequences for failure. Such games were successful in their employment of stealth gameplay but were also somewhat experimental. It was not until around the time the Tom Clancy–licensed espionage game *Splinter Cell* (2002) was released that the phrase *stealth game* began to emerge as a descriptive phrase for what had already become an obvious trend in game design.

After this initial stealth boom in the late 1990s and early 2000s, there have been few new pure stealth franchises. Rather, stealth gameplay began to crop up in other genres to a lesser or greater degree. Action-adventure series such as *Tomb Raider* and *Uncharted*, cartoon platformers such as *Sly Cooper*, and movie and comic book character tie-in series such as *The Chronicles of Riddick* and the *Batman: Arkham* games incorporated stealth as major gameplay elements. The survival horror genre, a natural match for stealth because of its reliance on weak protagonists versus strong enemies, has increasingly embraced the form in the *Siren*, *Amnesia*, and *Last of Us* series and in games such as *Alien Isolation* (2014). Long-standing role-playing franchises such as *Fallout* and *The Elder Scrolls* and games such as *Vampire: The Masquerade: Bloodlines* (2004) have also increasingly embraced stealth as a major playstyle, and while this style is partially rooted in classic pen-and-paper role-playing games (RPGs), the particular way these franchises have applied stealth to immersive three-dimensional worlds owes more to video games like *Thief* than it does to tabletop games.

With the explosion of the indie scene in the late 2000s, there has been a plethora of genre-bending stealth titles, including *Mark of the Ninja* (2012; 2-D platformer stealth), *Invisible, Inc.* (2015; turn-based strategy stealth), *Volume* (2015; puzzle stealth), and *Republique* (2016; point-and-click adventure stealth), suggesting the form’s healthy survival as distribution and markets evolve. The genre that seems to have the strongest relationship with stealth gameplay is the immersive sim, the origins of which are themselves tied up in the initial stealth boom. Direct revivals such as *Deus Ex: Human Revolution* (2011), *Thief* (2014), and *Hitman* (2016) as well as spiritual successors such as the *Dishonored* series have been the torchbearers for the more systemic, immersive flavor of stealth that established the form, as have long-running blockbuster stealth franchises such as *Metal Gear* and *Splinter Cell*.

These types of games do seem to be bleeding into another genre, the open-world game, which is probably the genre with the widest footprint that has most consistently embraced stealth as a major gameplay style. Monster franchises such as *Grand Theft Auto* pioneered stealth in an open-world context so that today we see it in most games of this type, from *Horizon: Zero Dawn* (2017) to *The Legend of Zelda: Breath of the Wild* (2017). Indeed, the largest open-world franchise in existence, *Assassin’s Creed*, has stealth as its foundational gameplay type, and even the longest-running stealth game franchise, *Metal Gear*, expanded to an open-world model in its final installment, suggesting that the pairing of stealth and open-world gameplay will remain a norm in games for some time.

It is unclear whether stealth will mainly become a component of open-world game design or whether it will continue to experience revivals in games of smaller scope. In any case, from its origins, it seems to have left enough of an impression on general trends in game design to remain a recognizable gameplay style for future developers to employ for whatever purposes they choose.

Matthew Weise

See also: Strategy Games

Further Reading

Avard, Alex. “The 10 Best Stealth Games You Can Play Right Now.” GamesRadar +, September 14, 2017. Available at https://www.gamesradar.com/best-stealth-games/.

Davenport, James. “The Best Stealth Games on PC.” *PC Gamer*, February 10, 2020. Available at https://www.pcgamer.com/best-stealth-games/.

Steam (Portal)

Steam is a multiplatform digital distribution portal that provides users with a variety of features, including game downloads, automatic updating, matchmaking servers, and cloud-saving services. Steam allows users on PC, Mac, and Linux computer systems to download and play games with friends across all these computer systems, and it can be used on mobile platforms and streamed to televisions as well. Developed by Valve Corporation, Steam also provides a community forum where players can interact with other Steam users. The official release of Steam occurred on September 12, 2003, as Valve attempted to create a portal to help distribute and promote updates for its online games. Originally featuring only Valve games, Steam began to take off in 2004 when Valve required the use of Steam to play its critically acclaimed *Half-Life 2* (2004). In 2005, non-Valve games became available on Steam, and in 2006, over one hundred different games could be downloaded there. With a variety of unique marketing techniques, such as a Top Sellers category, sales listed by percentages, and an integrated search function, Steam became a front-runner in the digital sales of video games.

In 2008, Steam also introduced the software development tool Steamworks to invite game developers to optimize their games for the Steam interface, allowing anyone to publish their games on Steam. Steam has been attempting to compete in the competitive streaming and hardware markets with limited success. Steam TV streams esports and other game events in an effort to compete with Twitch as a streaming platform.

Steam also released Steam Machines, which are computer gaming systems optimized to work with the Steam library of games. Partners of the Steam Machines include popular computer gaming companies such as Alienware and Syber. Steam Greenlight, which transitioned into Steam Direct, is a publisher program that allows game developers a chance to distribute their games independently through the Steam platform. All in all, Steam is attempting to be a complete gaming platform for players, developers, and gaming industry professionals.

Steam's digital library now has thousands of games available for purchase and download including nostalgic favorites of longtime gamers and more recent popular online games. Their top games for players include *PlayerUnknown's Battlegrounds* (PUBG Corporation, 2017), *Dota 2* (Valve Corporation, 2013), and *Counter-Strike: Global Offensive* (Hidden Path Entertainment & Valve Corporation, 2012).

Ashley P. Jones

See also: Esports

Further Reading

Steam website. Accessed October 2, 2020. Available at https://store.steampowered.com/.

Strategy Games

A strategy game is one that emphasizes thoughtful and planned use of resources to achieve victory. The genre has a long history; it was a prominent part of the early history of video games, and it is still a significant part of today's video game industry and culture. Because strategy games typically demand extended play sessions, they were better suited to the early mainframe and home computer platforms than the quarter-swallowing, short-play action games of the arcade. The genre is still strongly associated with personal computers. There are numerous varieties of strategy games, and many other genres, such as role-playing games (RPGs), platform games, and even action games incorporate strategy elements.

Within the domain of video games, the term *strategy* usually applies to things such as the management and development of in-game resources, such as the wood and gold of *Warcraft III* (2002); the judicious timing of combat or other kinds of conflict, such as taking an opponent's piece in *Battle Chess* (1988); and the exploration of game worlds to gain advantages, such as sending scout units to discover the world map in *Civilization II* (1996). All of these actions have costs and potential benefits. For example, exploration in the *Civilization* games requires the player to spend build points creating scout units and requires tasking those units to exploration when they could be doing something else. These costs are balanced by opportunities to find valuable resources to exploit, scout enemy military forces, and discover new locations to build cities. The player must therefore make strategic decisions about the amount, speed, and kind of exploration to engage in. Inevitably, different kinds of strategic decisions have an impact on each other: creating exploration units has an impact on economic planning and military options.

Video games that are called strategy games always emphasize deliberate planning of gameplay decisions. This often means these types of games usually place little or no emphasis on the motor skills of a player, such as in the turn-based game *X-COM 2* (2016). Many strategy games, such as *Company of Heroes 2* (2013), are indeed fast paced, but whatever benefits a player's speed and reflexes grant, intelligent play is crucial to beating an opponent of a similar skill level. In addition, many games that are *not* called strategy games incorporate video game elements that are typically part of the strategy genre. For example, most games labeled "simulations"—such as *Cities: Skylines* (2015)—involve careful strategic management of resources. Even action and RPGs, such as *Fallout 4* (2015), allow for strategic investments and character development that are reminiscent of strategy gameplay.

The line between strategy and tactics in video games is a contested one. Typically, the word *strategy* applies to decisions that affect the global state of gameplay (such as which technologies to pursue in *Rise of Nations* [2003]) or games that focus on high-level decision making (such as Chris Crawford's *The Global Dilemma: Guns or Butter* [1990], which involves a player determining whether a country should invest primarily in military might or economic development). *Tactics* usually apply to decisions that affect only parts of the game (such as orders given to units in combat in *StarCraft* [1998]) or to games that focus on unit-level decision making (such as the action/role-playing/strategy hybrid *Valkyria Chronicles* [2008] or the building/combat game *Fortnite* [2017]). In other words, strategy games will typically focus on things such as geopolitics, management of economic systems, or the movement of entire armies, whereas tactical games may look at managing an individual political campaign or controlling a limited number of units on an individual battlefield. In practice, however, the terms are often used interchangeably.

Strategy games have a very long history. Arguably, most of the classic board games existing before the video game era—such as the ancient Egyptian game Senet, chess, or Monopoly—are strategy games. However, most of today's strategy video games find their roots in some way, shape, or form in modern war gaming, which dates back to military training games developed in the 1800s. Although armies continued to train officers this way in the twentieth century, small groups of war-gaming enthusiasts played similar battle and war simulations for entertainment. These board games ranged from simple ones like *Risk* (1959), to complicated, detailed recreations of war, like Avalon Hill's *Blitzkrieg* (1965). This gaming culture gave birth to RPGs (via Chainmail [1971] and Dungeons & Dragons [1974]) and set the style and tone for early strategy games.

The mainframe computer culture of the 1960s and 1970s produced a number of text-based strategy games whose program code circulated freely and constantly morphed as programmers modified the games. *Civil War* (1968), for example, simulated high-level strategic approaches to Civil War battles. Peter Langston's *Empire* (1972) is a multiplayer conquest game, and *Hamurabi*, first developed by Doug Dyment as *The Sumer Game* (1968), is an extremely influential economic management game set in ancient Sumer. Other early games with strategic elements include Gregory Yob's maze puzzle game *Hunt the Wumpus* (1972) and the pioneer-themed travel game *The Oregon Trail* (1971).

Most of these games were ideal for the new home computer market of the 1970s and early 1980s, as the programs required few graphic capabilities and little processing power. Text-based strategy games were released as line-by-line programs in computer enthusiast magazines such as *Creative Computing*, but by the 1980s, some games were marketed as a manufactured product, usually featuring at least rudimentary graphics, and were sometimes almost as visually advanced as home computer action games. Examples include the space colonization management simulation *M.U.L.E.* (1983), the New World conquest game *The Seven Cities of Gold* (1984), and SSI's space empire-builder *Imperium Galactum* (1984). More action-oriented games had significant strategic elements, such as the cartoon combat game *Spy v. Spy* (1984) and the medieval knight simulator *Defender of the Crown* (1986).

Several important subgenres of strategy games became industry standards in the 1990s. The release of *Sid Meier's Civilization* (1991) helped to create the "4X" (eXplore, eXpand, eXploit, eXterminate) subgenre, a term coined by Alan Emrich in 1993 and widely used today by gamers and the game industry. These games are typically large-scale, highly complex games that require players to explore worlds to find resources necessary to grow their power and defeat their enemies. Games explicitly identified as 4X are typically turn-based strategy games. Whereas *Civilization* was hardly the first game to incorporate these gameplay elements—some aspects of the subgenre clearly date back at least as far as *Hamurabi*—its success encouraged the publication of a spate of similar games, such as *Masters of Orion* (1993), *Masters of Magic* (1994), and *Colonization* (1994). These games are also often called *god games* because they give the player godlike powers over vast territories, cultures, and stretches of time.

A larger commercial subgenre (and one that is well defined and recognized in the gaming industry and community) is the real-time strategy (RTS) game that effectively started with *Dune II* (1992). These games, like many 4X games, typically emphasize the accumulation of resources and production of combat units. However, game action is real time, not turn based, and most RTS games require the construction of buildings in a base to progress and create units. Again, several games with similar gameplay elements, such as *The Ancient Art of War* (1984), preceded *Dune II*, but the latter game very quickly inspired a large group of similar titles, such as *Warcraft: Orcs & Humans* (1994), *Command and Conquer* (1995), *Age of Empires* (1997), and *StarCraft* (1998).

Around 2003, a mod of *Warcraft III*, called *Defense of the Ancients* (*DOTA*), drawing on previous titles, effectively introduced an RTS variant genre known as the multiplayer online battle arena (MOBA). This genre reached global prominence with games such as *League of Legends* (2009) and *DOTA 2* (2013). These games feature combat similar to their RTS predecessors, but they have no base building or resource gathering and a predictable, fixed map. In fact, these games are often more tactical than strategic, but they do have a close connection with RTS games.

The explosion of mobile games following the introduction of the first smartphones led to a popularization of strategy games for a more casual market. Titles such as *Clash of Clans* (2012) and *Mobile Strike* (2015) are simpler than a full-fledged turn-based game like *Civilization*; consequently, they appeal to a wider audience and have at times generated immense followings and substantial revenues: in 2015, *Clash of Clans* averaged around $5.5 million revenue per day.

Strategy games fall into a number of categories (beyond the well-defined subgenres previously listed). One of the big division lines among strategy games is whether they are turn based, such as the fantasy war game *Heroes of Might and Magic* (1995), or real time, such as *Syndicate* (1993). The former waits for players to complete turns before the game proceeds, and the latter allows activity to continually occur, whether the players act or not.

Another distinguishing characteristic that divides strategy games is whether they are real-world simulations. Strategy classics such as the *Civilization* and *SimCity* series attempt to model actual history, economic development, and political systems, whereas digital versions of games such as Go and backgammon are clearly abstract. And many strategy video games simulate fantasy worlds, such as *Age of Wonders 3* (2014).

Strategy games also vary in terms of the number of players involved and to what degree artificial intelligence (AI) is involved. Many strategy games are single-player games in which the player struggles against the computer, such as the original *Civilization*. Other games, such as *Dominions 5: Warriors of the Faith* (2017), feature both single-player campaigns and multiplayer styles of play. Multiplayer games can allow for “hotseat” play (multiple humans taking turns on the same computer, such as in *Gold of the Americas* [1989]); play over the internet or local networks, such as *Total War: Warhammer II* (2017); or the computer taking the role of players via AI, such as in *Battle for Middle-Earth* (2004).

Kevin Schut

See also: Board Games; *StarCraft*

Further Reading

Brown, Fraser. “The History of the Strategy Game.” *PC Gamer*, December 24, 2018. Available at https://www.pcgamer.com/the-history-of-the-strategy-game/.

DeMaria, Rusell, and Johnny L. Wilson. *High Score! The Illustrated History of Electronic Games*. Berkeley, CA: McGraw-Hill/Osborne, 2002.

Edwards, Benj. “The History of Civilization.” Gamasutra, July 18, 2007. Available at http://www.gamasutra.com/view/feature/1523/the_history_of_civilization.php.

Streaming

The term *streaming* is used as a metaphor comparing the flow of digital content through a broadband connection to the continuous flow of water in a stream in nature. It is a method of presenting digital information continuously and receiving digital content, usually video or audio, continuously as it is being used, as opposed to downloading the entire amount of a program and storing it to be used later. *Livestreaming* refers to sending of the video or audio of an event as it occurs live, including the playing of video games.

Although the term developed in regard to digital media as an alternative to the downloading of a complete file before use, analog technology used streaming as well. Broadcast television programs were sent out in a continuous stream as well as radio; although such broadcasting is generally not referred to as streaming, with the term mainly being reserved to digital media to distinguish it from downloaded or stored programs.

User requirements for streaming media include having enough bandwidth to receive the stream of data and the right software to interpret and display the data in real time. Streaming services include video services such as Netflix, Amazon Prime, Hulu, and others as well as audio services such as Spotify and Apple Music. Subscribers to these services pay a monthly fee for the use of the service, and that use is usually limited to a set number of devices that can use the service at any given time.

Streaming has changed the marketing of digital content, from the rental of videotape and optical disc storage to direct streaming over the internet, requiring users to have an internet provider. Unlike the use of storage media, the content can become unavailable if something happens to it at the site of origination or due to signal degradation along the way. Streaming also affects movie collecting; instead of owning a movie on a disc, you can only rent access to it for a limited amount of time. The streaming of copyrighted material without permission may also be considered infringement, even though no copy of the material is stored.

During the mid-2010s, the streaming of live video game play became popular on sites such as YouTube and Twitch. By 2014, there was more streaming traffic on Twitch than on HBO's online service. In 2015, YouTube started the subsite YouTube Gaming to compete with Twitch.

Mark J. P. Wolf

See also: Social Media; Twitch

Further Reading

"What Is Streaming?: How Video Streaming Works." Cloudflare. Accessed October 2, 2020. Available at https://www.cloudflare.com/learning/performance/what-is-streaming/.

Street Fighter II

Street Fighter II refers to a subseries of six (excluding hacks and nonofficial modifications) fighting games developed by Capcom for the arcade. The first iteration, *Street Fighter II: The World Warrior* (1991), was built on several conventions established in the earlier *Street Fighter* (1987). In *Street Fighter II*, two characters engage in one-on-one combat using a variety of punches, kicks, and special attacks to deplete each other's health meters. When a character runs out of health, he or she is knocked out, and the opponent wins the round; the first to win two rounds wins the match. Rounds are also timed: if both characters are still standing when time runs out, the round goes to the player with the most health remaining.

The game is played with an eight-way joystick and six attack buttons, corresponding to three punches and three kicks of varying strength and speed. Each character also has a variety of "special moves," which are performed by inputting a series of directions and then pressing an attack button.

Street Fighter II: The World Warrior is often credited with sparking the fighting game craze that swept the United States in the early to mid-1990s. At the peak of the craze, *Street Fighter II* cabinets could be found in many retail locations, including liquor stores, bowling alleys, and convenience stores, in addition to traditional video arcades. In the game, there are eight characters players can choose from and four unavailable "boss" characters. In the single-player mode, the player chooses a character and then fights the seven other characters followed by the four boss characters. The single-player mode also includes bonus rounds, including the now iconic game in which the player must destroy a car. In the two-player version, each player picks a different character, and they play against each other. The winner stays in the game, and the loser must insert another coin to continue play.

Street Fighter II eventually went through five revisions. Although each featured numerous minor changes and balance adjustments, only the major changes will be noted here. *Street Fighter II: Champion Edition* was released in April 1992 and allowed players to choose from the four boss characters, bringing the available character count up to twelve. *Street Fighter II: Hyper Fighting* (December 1992) is widely believed to be a response to the growing number of hacked *Street Fighter II* cabinets. This revision drastically increased the speed of the game and introduced new special attacks for several characters. The fourth installment, *Super Street Fighter II: The New Challengers* (October 1993), added four new characters and returned gameplay to its original speed. This latter decision was widely unpopular. *Super Street Fighter II Turbo* (March 1994) increased the game speed again and added "super combos." Characters now had a meter at the bottom of the screen that filled as they performed attacks. Once full, the character could unleash a powerful super combo attack. The final arcade release, *Hyper Street Fighter II* (December 2003, Japan only), allowed players to choose characters from any *Street Fighter II* version to fight against a character from any other version. For example, Ken from *World Warrior* could fight Cammy from *Super*. This version eventually saw release in the United States as part of the *Street Fighter Anniversary Collection* on the Sony PlayStation 2 (2004) and Microsoft Xbox (2005).

Jason Scott Begy

See also: Arcade Games; Fighting Games

Further Reading

Baker, Chris. "The 25-Year Legacy of *Street Fighter II*, in the Words of the Experts." Gamasutra, February 5, 2016. Available at https://www.gamasutra.com/view/news/264509/The_25year_legacy_of_Street_Fighter_II_in_the_words_of_the_experts.php.

Strong National Museum of Play

Opened to the public in 1982, the Strong National Museum of Play is a history museum in Rochester, New York, that owns and cares for the world's most comprehensive collection of toys, dolls, board games, video games, jigsaw puzzles, books, documents, and other historical materials related to play. The museum uses these collections to explore play and the ways it encourages learning, creativity, and discovery and illuminates cultural history.

The museum's 285,000-square-foot facility in Rochester explores the history and meaning of play in interactive exhibits that attract more than 550,000 guests a year. Among the long-term exhibits at the Strong are *eGameRevolution* (which explores the history of video games), *Pinball Playfields* (on the history of pinball), *Game Time!* (on the development of board games in the United States), and a display on the Academy of Interactive Arts and Science's D.I.C.E. award winners. The museum also regularly produces online and temporary exhibits, such as *Atari by Design* (2013), *Playing with Power: Celebrating 30 Years of the Nintendo Entertainment System* (2015), *Raceway Arcade* (2017), and *The Oregon Trail, MECC, and the Rise of Computer Learning* (2017).

To create these exhibits, staff at the Strong draw on the museum's unmatched and rapidly growing collection of more than five hundred thousand artifacts related to play. This unprecedented assemblage offers a unique interpretive and educational window into how play reflects cultural history and the critical role of play in human physical, social, emotional, and intellectual development.

The Strong's collections are accessed by scholars from all over the world, who are often supported by museum-funded research fellowships. The museum also publishes the *American Journal of Play*, a peer-reviewed, interdisciplinary journal that discusses the history, science, and culture of play. The journal aims to increase awareness and understanding of the role of play in learning and human development and the ways in which play illuminates cultural history.

The Strong has been collecting, preserving, and interpreting the history of video games since 2006, largely under the auspices of the International Center for the History of Electronic Games. The museum's collection of more than sixty thousand video games and related artifacts ranges from early arcade games to the most recent downloadable indie games. The Strong is also home to the National Toy Hall of Fame and the World Video Game Hall of Fame, which annually inducts games based on criteria of icon status, influence, geographic reach, and longevity.

To facilitate its long-term growth, the Strong is undertaking a major 100,000-square-foot expansion, expected to be completed in 2021, which will feature major exhibits on the importance of video games.

Through all these activities, the Strong seeks to ensure that present and future generations understand the critical role of play in human physical, social, and intellectual development and the ways in which play reflects cultural history.

Jon-Paul C. Dyson

See also: Archives; Preservation

Further Reading

The Strong National Museum of Play website. Accessed October 2, 2020. Available at https://www.museumofplay.org/.

Subcreation

The term *subcreation* refers to the building of imaginary diegetic worlds within and across a variety of media. Originally coined by J. R. R. Tolkien, the term is used to distinguish human creation from God's *ex nihilo* creation as well as to indicate its reliance on the latter through the use of the *sub* designation (the term literally means "creating under"). Subcreation also refers both to the process and product of world-building while avoiding philosophically slippery terminology such as *real* and *imaginary*, which tend to be seen as mutually exclusive domains. Unlike other approaches that are medium or narrative specific, the study of subcreation is concerned with the world itself, in which multiple narratives can occur and be viewed through a variety of media windows (such as film, television, comic books, novels, or video games). This approach is particularly well suited to video games, where diegetic worlds, unlike those of other media (e.g., film, television, print), contain an interactive element that often allows for navigation and exploration of the world under the player's control. Some video games are also part of larger transmedia worlds and thus must be considered with the rest of the world in mind, whereas others are self-contained and exist on their own within a single game or game series.

The study of subcreated worlds looks at each world as a whole and is concerned with the world's inner consistency as well as its global structures and the way in which they relate to the smaller-scale local structures within the world. Global structures include those of space (maps, layouts, connections between places); time (chronologies, histories, the timing of events); the genealogies, languages, and cultures of the world's inhabitants; and narratives that incorporate all of these. The worlds of video games, which range from simple single screens of flat graphics to elaborate three-dimensional online worlds populated by millions of characters, can also contain various ontologies and rules by which they operate, which players must learn when they vicariously inhabit these worlds through the use of avatars. Examining video games through a subcreative approach produces a more holistic view of their diegetic worlds and one that is not limited by medium or narrative; rather, it looks at a world as a whole and something worthy of analysis in itself. As the diegetic worlds of video games grow larger and more detailed and complex, such an approach grows in relevance and provides a way to discuss the design of the world in such a way as to make it distinct from the design of the game as well as to discuss it in comparison to other subcreated worlds or to the appearances of the same world in other media.

Mark J. P. Wolf

See also: World (of a Video Game)

Further Reading

Lewis, C. S. *Of Other Worlds: Essays and Stories*. Edited by Walter Hooper. New York: Harcourt Brace & Company, 1966.

Morris, Dave, and Leo Hartas. *The Art of Game Worlds*. New York: HarperCollins, 2004.

Tolkien, J. R. R. “On Fairy-Stories.” In *Tree and Leaf*, 9–73. London: George Allen & Unwin, [1964], 1988.

Wolf, Mark J. P. *Building Imaginary Worlds: The Theory and History of Subcreation*. New York: Routledge, 2012.

Suicide Battery

Suicide battery is the term used by collectors to describe a small battery found in certain arcade games. This battery sends a current to the random-access memory (RAM) that holds a decryption table. The decryption key is used to decode the program code in the game’s read-only memory (ROM), so when the battery dies, the RAM is erased. Without the decryption key, the game can no longer run. In certain Capcom games, the suicide battery powers a custom chip that handles game graphics, which will not display correctly when the battery runs out.

Presumably installed to fight piracy, these batteries also limit the life of an arcade machine, leading many collectors to believe that the batteries were installed to require operators to buy more units as the old ones expired. Several companies used suicide batteries in their arcade games, including SEGA, which began using them around 1986; Capcom, whose system used them from 1989 onward; and Gaelco, an arcade game manufacturer in Spain. According to the Dead Battery Society’s webpage, SEGA games using a suicide battery include *Action Fighter* (1986), *Alex Kidd and the Lost Stars* (1986), *Alien Syndrome* (1986), *Out Run* (1986), *Altered Beast* (1988), *Gain Ground* (1988), *Crack Down* (1989), *Golden Axe* (1989), *Laser Ghost* (1989), *Line of Fire* (1989), *Super Monaco GP* (1989), *Turbo Out Run* (1989), *Aurail* (1990), *Bloxeed* (1990), *Clutch Hitter* (1991), and *Desert Breaker* (1992). Capcom games using suicide batteries include *Adventure Quiz Capcom World* (1989), *Capcom Baseball* (1989), *Dokaben* (1989), *Super Buster Bros.* (1990), *Captain Commando* (1991), *The King of Dragons* (1991), *Three Wonders* (1991), *Adventure Quiz Capcom World 2* (1992), *Cadillacs and Dinosaurs* (1992), *Knights of the Round* (1992), *Warriors of Fate* (1992), *The Punisher* (1993), and *Saturday Night Slam Masters* (1993). Gaelco games using suicide batteries include *TH Strikes Back* (1992; also known as *Thunder Hoop II*), *Glass* (1993), *Alligator Hunt* (1994), *Touch and Go* (1995), *World Rally 2* (1995), and *Maniac Square* (1996).

To preserve the lives of their machines, some collectors have published instructions on the internet that describe how suicide batteries can be removed and replaced without losing the current to the RAM holding the decryption key and also how to reprogram the EPROM (erasable programmable read-only memory), eliminating the need for a suicide battery altogether. In some cases, the encryption on the code ROMs has been broken, allowing the ROMs to be reprogrammed even if the battery has died and the decryption table is erased.

Mark J. P. Wolf

See also: Arcade Games

Further Reading

"Decryption and Removal of Suicide Batteries in SEGA Boardsets." Retro Clinic. Accessed October 2, 2020. Available at http://www.retroclinic.com/leopardcats/decrypt/decryption.htm.

Lindquist, Timothy. "The Dead Battery Society." 2001. Updated March 14, 2014. Available at http://www.arcadecollecting.com/dead/dead.html.

Super Mario Bros. *See Mario* Series

Super Nintendo Entertainment System (SNES)/Super Famicom

Nintendo released the Super Famicom in 1990 in Japan and the Super Nintendo Entertainment System (SNES) in 1991 in North America and 1992 in Europe. The naming choice was intended to leverage the widespread success of its predecessor, the Famicom/Nintendo Entertainment System (NES), which had dominated the home video game markets of Japan and North America after its release. Nintendo's plan was to sit back and profit from Famicom/NES sales for years, but the looming threat of an upcoming competitor, the NEC PC-Engine console in Japan (eventually released in North America as the TurboGrafx-16), stirred the sleeping giant into announcing a follow-up 16-bit console in 1987—the Super Famicom—with promises of state-of-the-art technical capabilities. Its release allowed Nintendo to successfully counter the PC-Engine in Japan and to mitigate the success of the SEGA Genesis in North America (known as the SEGA Mega Drive in all other markets) during a heated console war from 1991 to 1995. Nintendo then lost the market lead to new rival Sony, which released the PlayStation, and its next console, the Nintendo 64, did not recapture the kind of market share Nintendo had been known for since the NES.

The SFC/SNES's development was an eleventh hour reaction to a technologically superior competitor, and as such, it faced a conundrum: it needed to match or exceed its competitor's technical capabilities to convince game developers and consumers that it would be the dominant next-generation system; yet, it also needed to be affordable like its 8-bit predecessor had been and to build upon its success. For more than a year, through press conferences and news reports, a backward compatibility feature (that would allow consumers to retain their Famicom game libraries) was said to be coming, but the costs of supporting Famicom games with the new hardware proved too costly in the end.

The displacement of the NES by the Super Nintendo Entertainment System (SNES) in the United States (meaning the need to invest into a new machine to replace the old) at a time when the NES still enjoyed considerable success created a significant amount of negative consumer response that profited SEGA's quicker entry in the 16-bit generation, the SEGA Genesis. Even without backward compatibility, the rushed development and need to bridge with the past, combined with the need to cut costs and deliver a new console quickly, left a mark on the system's components and architecture. The Super NES, as evidenced by its name, is best understood as an extension or upgraded version of the same underlying principles that were responsible for the NES. To push games further in an era of rapid technological development, the overarching philosophy of the console was to use low-cost base components dedicated to specific functions and arranged in a modular architecture with expandability in mind for future proofing instead of gambling on a costly single and powerful central processing unit that should offer lasting performance for many years ahead.

The SNES sports a picture processing subsystem like the NES, but this time it had two dedicated units (PPUs): the PPU1 handling the regular sprite and background graphics and the PPU2 being responsible for special effects. A separate audio processing unit (APU) processes and outputs sound and music with eight channels of (severely limited) sound samples. The APU is especially notable for using Sony's SPC700 sound chip, marking the beginning of a relationship between the firms that would ultimately spawn the PlayStation. Finally, the SNES could integrate a peripheral through its expansion port and also stream data (and eventually offload processing tasks) directly from the cartridges, which would feature custom enhancement chips to improve the baseline capabilities of the console.

Expansion chips were extensively used in many games, starting right from the system's birth with *Pilotwings* in 1990, but the expansion port was practically unused. Japan saw the release of the Satellaview in 1995, a satellite modem accessory that received broadcasts of varying nature following a schedule: games, digital magazines, news and advertisement, and so on. The most promising use of the expansion port was to be the SNES CD-ROM accessory, announced with great fanfare as a partnership with Sony to match the technological edge of Nintendo's competitors, but the CD-ROM was never marketed, as Nintendo stalled and announced another CD-ROM attachment with Philips, which failed to come through as well. A prototype unit of the Sony SNES-CD peripheral was recovered in 2016, stirring widespread interest in the case and the development of homebrew games to use the machine's specifications as hacks and thought experiments.

The technical components of the SNES were arranged around the needs and practices of game developers of the time, who had developed a number of techniques for programming NES games, such as implementing different scrolling backgrounds or displaying environments in pseudo-3-D perspective. The 16-bit successor automated some of these operations into a number of preset background graphical modes hardwired into the system. These eight graphical modes, set from 0 to 7 in the machine, allow different arrangements for up to four layers of scrolling backgrounds, with 4, 16, or 256 colors and differing properties for rendering graphics, such as a pseudo-high-resolution setting, transparency, and color mixing.

Visually, the SNES was a huge improvement over the NES, and the complex interweaving of specific settings was reduced into simple (and high) numbers in the press releases and promotion for the console: 32,768 colors, 128 moving objects (sprites), and myriad special effects, such as parallax scrolling, mosaic tiling, zoom, rotation, and 3-D perspective. Nintendo claimed technical superiority with these numbers and promoted its unique “Mode 7” graphics that would create 3-D environments. In reality, Mode 7 performed matrix transformations (rotation, translation, scaling, and shearing) on 2-D planes, creating only *illusions* of depth and perspective, albeit convincing ones.

The system’s architecture and approach of skirting around the promises of 3-D gaming illustrate Nintendo’s mixed stance on technological innovation overall, particularly in the SNES era. Over the years, the SNES embraced the new horizons of the future of gaming, but from the current vantage point of established practices. Games that looked three-dimensional were still created and operated in layers of 2-D graphics. Full-motion video (FMV), powered by CD-ROM attachments, was gaining momentum on the PC, SEGA Mega Drive/Genesis, and NEC PC-Engine/TurboGrafx-16 front, but the announced SNES CD-ROM peripherals never materialized. The shift to full-fledged three-dimensional games, rendered in real-time through computer-generated polygons and simulation, was eschewed (save for a handful of cases—*Star Fox* [1993], *Vortex* [1994], *Stunt Race FX* [1994], *Dirt Racer* [1995], *Dirt Trax FX* [1995], and *Winter Gold* [1996]—thanks to expansion chips); instead, computer-generated three-dimensional models were pre-rendered in high-quality animated frames, which were then integrated in classic 2-D genres in games such as *Donkey Kong Country* (1994) and *Killer Instinct* (1994). Games in fully simulated 3-D that were developed by Nintendo’s expert partner Argonaut Software (who had been working with Nintendo since the development of the SNES, helping with *Pilotwings* and developing the Super FX chip integrated in *Star Fox* and many other high-profile games, such as *FX Fighter* and *Star Fox 2*) were not released.

The resistance to experimentation and the focus on lucrative and proven genres, steered in part by the system’s architecture, was also the result of the business model and practices that Nintendo had imposed with the NES: an emphasis on high-quality games in fewer numbers, with appropriate care and consideration, as enforced through restrictive publishing agreements and a robust internal certification process before green-lighting games from third-party firms. In North America, Nintendo’s tight control over the market, a classic “walled garden” approach to partnering with other firms, contrasted with SEGA’s (and eventually even more with Sony’s) more liberal licensing policy.

The competition forced Nintendo to soften its restrictive policies to accommodate its partners, particularly after the *Mortal Kombat* (1992) fiasco. Although the Genesis port of the highly violent arcade title kept all the blood and gore that contributed to its appeal (safely locked away behind a “secret code” that quickly became widespread knowledge as it circulated through video game magazines), Nintendo forced Acclaim to tone down the SNES version, having characters lose gray “sweat” instead of blood during combat and similarly limiting the “fatality moves” to less gory variants. This version of the game was largely derided and tarnished Nintendo’s image as a “kids’ games” company, which played right into SEGA’s marketing strategy of targeting older teens. Although the Genesis did not outsell or surpass the SNES (except in Europe and Latin America), Nintendo’s public image was as damaged as its reputation among game developers, who considered its policies overbearing. When Sony moved in with its PlayStation in 1995, many gamers and game makers felt they were ready for more. Nintendo went from a totalitarian grip on the home video game console market with the NES to a modest lead with the SNES. This slow erosion would later continue with the Nintendo 64 and Nintendo GameCube systems.

The Super NES honored the NES's legacy of housing a wide variety of high-quality games and franchises. Worthy of mention are Nintendo's first- and second-party games *Super Mario World* (1990), *F-Zero* (1990), *The Legend of Zelda: A Link to the Past* (1991), *Super Mario Kart* (1992), *Star Fox* (1993), *Super Metroid* (1994), *Donkey Kong Country* (1994), and *Super Mario World 2: Yoshi's Island* (1995). While fighting games and arcade ports were the Genesis's forte, the SNES had its share with *Street Fighter II* (1992), *Fatal Fury* (1992), *Killer Instinct* (1994), and the previously mentioned *Mortal Kombat*.

One of the console's strong suits was role-playing games (RPGs), the bulk of which were developed by Square or published by Enix, rival companies that later merged. Notable games included Square's *Final Fantasy 2* (1991), *Secret of Mana* (1993), *Final Fantasy 3* (1994), *Chrono Trigger* (1995), and *Super Mario RPG* (1996); Enix's conceptual action-RPG series *ActRaiser* (1990), *Soul Blazer* (1992), *Illusion of Gaia* (1993), and *Terranigma* (1995; released in Japan and Europe only) as well as other stand-alone titles, such as the strategy-RPG *Ogre Battle: The March of the Black Queen* (1993) and *The 7th Saga* (1993); and, finally, Capcom's *Breath of Fire* franchise also originated on this system with *Breath of Fire* (1993) and *Breath of Fire II* (1994).

Action and platform games were numerous, but some of the more recognized classics included Konami's *Super Castlevania IV* (1991), *Contra 3: The Alien Wars* (1992), and *Teenage Mutant Ninja Turtles IV: Turtles in Time* (1991) as well as Capcom's *Mega Man X* series. The total number of games released, give or take some for all territories, amounted to 535 in Europe, 720 in North America, and 1,440 in Japan. As with all platform title lists, the exact count depends on whether one includes special pack-in titles, altered rereleases, or combination and special-event cartridges, such as *Super Scope 6* (1992), *Donkey Kong Country Competition Cartridge* (1994), and *Super Mario All-Stars + Super Mario World* (1993). Eager fans have translated many of the Japan-exclusive games in recent years, particularly RPGs and games from known franchises, such as *Mystic Ark* (*The 7th Saga 2* [1995]) and *Seiken Densetsu 3* (*Secret of Mana 2* [1995]).

The console enjoys enduring popularity and is routinely hailed as one of the best consoles of all time. Nintendo released the SNES Classic in 2017, a miniature replica emulation machine with twenty-one onboard games, including *Star Fox 2*, officially released for the first time. SNES games are also released in virtual consoles and online Nintendo stores for the Wii and the Switch, yielding access to the beloved classics to younger generations.

Dominic Arsenault

See also: Nintendo Entertainment System/Nintendo Famicom

Further Reading

Arsenault, Dominic. *Super Power, Spoony Bards, and Silverware: The Super Nintendo*

Entertainment System. Cambridge, MA: MIT Press, 2017.

Evan, G. SNES Central. Accessed October 2, 2020. Available at http://www.snescentral.com.

"Nintendo Super NES/Super Famicom: Console Information." Console Database. Accessed October 2, 2020. Available at http://www.consoledatabase.com/consoleinfo/snes.

Sheff, David. *Game Over: How Nintendo Zapped an American Industry, Captured Your Dollars, and Enslaved Your Children*. New York: Random House, 1993.

Supergiant Games

Supergiant Games is an independent game development studio based in San Francisco, California. Originally founded in San Jose by Electronic Arts (EA) Los Angeles veterans Amir Rao and Gavin Simons, Supergiant has grown to twenty employees and released four critically acclaimed games over the first ten years of its existence. Supergiant's games are noted for their emphasis on characters and story, their distinctive visual style courtesy of art director Jen Zee, and their award-winning original scores written, produced, and performed by in-house composer Darren Korb.

Rao and Simons met while working on the *Command & Conquer* franchise at Electronic Arts' Los Angeles studio. In 2009, the pair decided to quit their jobs to work on a game of their own: an isometric action-adventure affair that would feature literal world-building (the world visibly comes into being as the player makes her way through it) and dynamic narration voiced by Logan Cunningham. That game turned out to be *Bastion* (2011), Supergiant's debut title that earned the fledgling studio several accolades, not the least of which a NAVGTR award for Cunningham's performance. Released for the Xbox Live Arcade as well as for the PC through Steam in the summer of 2011, *Bastion* sold over three million copies across all platforms by 2015 and was well received by consumers and critics alike.

Supergiant's sophomore effort, *Transistor* (2014), failed to improve upon its predecessor's reception but was a very successful release in its own right, selling over one million copies and earning over one hundred industry accolades, including nominations for Best Independent Game and Best Score/Soundtrack, a Game Developer's Choice Awards nomination for Best Audio, and a BAFTA nomination for Cunningham. Supergiant's next game, *Pyre* (2017), featured a rare mix of role-playing game (RPG) and sports game elements set within an original fantasy world. *Pyre*'s development was a time of experimentation for Supergiant. According to creative director Greg Kasavin, *Pyre* "didn't begin in some kind of document or pitch" (Francis 2016). Rather, the final game was the result of an extensive prototyping phase.

As *Bastion* and *Transistor* had done before it, *Pyre* performed well despite (or perhaps because of) its idiosyncrasies and helped solidify Supergiant's reputation for quality presentation in both visuals and sound as well as narrative design. In December 2018, Supergiant Games unveiled its fourth title, *Hades*, as part of the launch of Epic Games' online distribution platform, the Epic Games Store. On top of marking the beginning of a relationship with a new distributor, *Hades* was

Supergiant's first Early Access launch. In Kasavin's words,

> We conceived of [Early Access] of this game as part of the whole package right from the start. . . . We think of the Early Access launch almost as a sort of pilot episode of a series or something like that, where it's a lot of setup, you meet a lot of the characters, and you figure out what the conflict is all about. But the resolution of the story is not all in the game yet, and we'll roll out new characters and more events in the story over the course of the Early Access period, along with just improving every other aspect of the game with any luck. (Francis 2019)

Clearly, Supergiant Games has already begun to make an impact on the world of video games.

Etienne Brunelle-Leclerc

Further Reading

Francis, Bryant. "How Supergiant Games Aggressively Prototyped Its Way into *Pyre*." Gamasutra, April 25, 2016. Available at http://www.gamasutra.com/view/news/271161/How_Supergiant_Games_aggressively_prototyped_its_way_into_Pyre.php

Francis, Bryant. "Supergiant's Fourth Outing *Hades* Introduces a More Mature, Organized Dev Process." Gamasutra, January 17, 2019. Available at http://www.gamasutra.com/view/news/333495/Supergiants_fourth_outing_Hades_introduces_a_more_mature_organized_dev_process.php

Graft, Kris. "Road to the IGF: Supergiant Games' Dynamically Narrated *Bastion*." Gamasutra, February 22, 2011. Available at http://gamasutra.com/view/news/33156/Road_To_The_IGF_Supergiant_Games_Dynamically_Narrated_Bastion.php.

Kasavin, Greg. "*Transistor* Earns 100+ Industry Accolades, Sells More Than 600k Copies." *Supergiant Games* (blog), January 8, 2015. Available at https://www.supergiantgames.com/blog/transistor-earns-60-industry-accolades-sells-more-than-600k-copies/.

Survival Horror Games

Survival horror is the well-known label given to scary video games. The horror genre's main objective is scaring the audience, and it has found an excellent niche in video games because fear has a strong action tendency and is clearly object oriented. A frightened person commonly chooses between freezing motionless with the hope of going unnoticed, fleeing from the danger, or fighting the threat; a novel reader or film viewer can only witness a character choosing between these alternatives, but the gamer is often forced to make such a choice. Consequently, early in its history, video games have maximized the potential of scary situations and scenarios. From *Haunted House* (1981) for the Atari VCS 2600 to the PC text adventure game *The Lurking Horror* (1987), from the adaptation of *Friday the 13th* (1989) on the Nintendo Entertainment System (NES) to the multiple windows text-and-graphic adventure *Uninvited* (1986) for the Macintosh, and from *Project Firestart* (1989) for the Commodore 64 to *Sweet Home* (1989) for the Nintendo Famicom, gamers have found themselves plunged into typical horror stories, confronting the usual bestiary and evil of horror fiction.

Although early video games might have been considered frightening in their time, their depiction of horror was, if not textual, rather abstract with limited effects. By the 1990s, the technical capacities of home computers and home consoles (particularly the Sony PlayStation) had evolved enough to enable a mise-en-scène of fear similar to the horror film, raising the genre's popularity and identifying it specifically as *survival horror*. The term was coined for the Japanese game *Biohazard* (1996; known as *Resident Evil* overseas) for the Sony PlayStation. The formula, however, comes from both *Resident Evil* and the French game *Alone in the Dark* (1992) for the PC, which were in turn both inspired by George Romero's zombie movies.

Associated with the work of H. P. Lovecraft for commercial sake, *Alone in the Dark* was the first horror game to display three-dimensional polygonal characters and objects in two-dimensional pre-rendered backgrounds. The action is depicted from a variety of fixed camera angles that serve as much to conceal as to reveal the space of the game world. Choosing between two player characters (one of whom is the private detective Edward Carnby, who will become the main character in the subsequent four games of the series), gamers have to stay alive and escape from a mansion in which they have been trapped. To do so, they need to find various helpful documents, manage a limited inventory and scarce resources, solve many puzzles, and fight zombies or other dreadful monsters.

Resident Evil follows the same framework as *Alone in the Dark* and has trapped two playable members of a Special Tactics and Rescue Squad in a mansion filled with zombies and various mutated creatures. The game called attention to the genre by welcoming the gamer to "the world of survival horror." Played on the PlayStation, the game cannot be saved at any point; to save the progress, the gamer must find ink ribbons to be used in typewriters that are located in only a few rooms, adding to the tension. With more than twenty games, *Resident Evil* has become the most prolific horror series of all time (although not all of them are survival horror games).

Alone in the Dark and *Resident Evil* set the conventions of the genre. From a videoludic perspective, survival horror games remain action-adventure games that develop a specific storyline that draws on common horror themes and is told through cutscenes as well as various written or audio documents. Although survival is the principal issue in a majority of video games, it is emphasized by the vulnerability of the player character who, without the gun power and the supply of ammunition found in shooting games, has to face or run away from monstrous foes while finding his way out of labyrinthine spaces, gathering various items, solving puzzles, and overcoming obstacles. Survival horror games are also notorious for their clumsy controls, which make the game even more difficult—for both combat and movement through the game world.

From a horror perspective, the genre is defined by the use of all the horror film tropes, such as an eerie atmosphere in dark or claustrophobic spaces. To take advantage of the camera work and montage, the games show the player character from a third-person perspective. Predefined camera angles transform the off-screen space into a blind one where monsters hide and one from which they can come out at any time to startle and to kill the player character. Sound is exploited to immerse the gamer in the horrific universe, enabling threats to be sensed, suspected, or anticipated through forewarnings of the coming monsters.

Like any genre, survival horror has changed and evolved. *Silent Hill* (1999) replaced pre-rendered realistic backgrounds with a real-time three-dimensional dark and foggy resort town. With a more psychological approach to horror that explores the tortured mind of the player character, and with more imaginative and subtle anticipatory fright, *Silent Hill* has expanded the domain of survival horror to one of terror (it could even be called *survival terror*). Two devices, a flashlight illuminating the way and a pocket radio emitting white noise when dangerous creatures are nearby, help to elevate the level of dread. Among the subsequent games in the series, *Silent Hill 2* (2001) is considered to be one of the landmarks of the genre.

Fatal Frame (2002; known as *Zero* in Japan and *Project Zero* in Europe) has carried on in the same vein. In a truly Japanese tradition, the player character is young girl who has to fight ghosts in a mansion. The originality of the game and series (of the four installments *Fatal Frame II: Crimson Butterfly* [2003] is considered the most accomplished) comes from the weapon employed within the game; it is not with a gun but with a camera obscura that the gamer destroys the spirits, waiting for the ghosts to get as close as possible before pressing the trigger to cause the most damage. In *Siren* (2004; two other *Siren* games came out in 2006 and 2008), gamers play ten characters and use a sightjack system that enables them to see through the eyes of the zombie-like enemies and to learn how they move, with the aim of steering clear of them.

Avoidance and escape are at the core of games such as *Haunting Ground* (2005) and the *Clock Tower* series (1995–2003), in which young girls spend most of their time running away from assailants and hiding in various places until the threat is gone. In the former, the main protagonist, Fiona Belli, is helped by a dog, and in the latter, a panic meter needs to be tended, otherwise the player characters become difficult or even impossible to control. *Eternal Darkness: Sanity's Requiem* (2002) has a sanity meter that, once emptied, produces a range of disturbing effects: sounds of someone being tortured in another room, rooms turned upside down, a player character transformed into a zombie, a "disk error" message, and so on.

Games such as *Resident Evil 4* (2005), *Dead Space* (2009), *Resident Evil 5* (2009) and the more role-playing *Bloodborne* (2015) have come to be increasingly focused on action and on more accurate player character controls. As this trend emphasizing combat is moving away from the vulnerability and the fundamental notion of survival at the heart of the scary experience, another cluster of games have accentuated the need to flee.

Insofar as these games are more often played from a first- rather than a third-person perspective, we might say that they are not per se survival horror games. Yet, first-person perspective games have appeared since the beginning of the horror videoludic genre, starting with *3D Monster Maze* (1981), in which the gamer has to escape the lair of a Tyrannosaurus Rex before being devoured. Other first-person action-adventure games such as *Clive Barker's Undying* (2001), *Condemned: Criminal Origins* (2005) and *Call of Cthulhu: Dark Corners of the Earth*

(2005) are notable also works. With the *Penumbra* Trilogy in 2007–8, and specifically with *Amnesia: The Dark Descent* in 2010, indie developer Frictional Games has demonstrated the terrifying feeling of not having any means to defend oneself. *Outlast* (2013) and *Alien: Isolation* (2014) have, among other games, relied on mechanics of flight rather than fight. The effect of the first-person perspective, erasing the distance between the point of view and the point of action of the player character, has been accentuated with the use of the virtual reality (VR) headset putting the gamer—that is, the point of interaction—right in the game world. The significance of this option has been underscored by *Resident Evil VII: Biohazard* (2017), the first full triple-A scary game sold for the PlayStation VR.

Similar to literature, comic books, and cinema, the horror genre in video games will always remain popular, regardless of the cycles of hipness. As we might have thought that the survival horror genre could become "living dead," scary video games in general still embody and represent what is monstrous and what never dies.

Bernard Perron

Further Reading

Perron, Bernard, ed. *Horror Video Games: Essays on the Fusion of Fear and Play*. Jefferson, NC: McFarland, 2009.

Perron, Bernard. *The World of Scary Video Games: A Study in Videoludic Horror*. New York: Bloomsbury, 2018.

Sustainability

Video games arose during the late 1960s and 1970s, around the same time as the growth of environmentalism, but their technological basis and digital and virtual nature did not make them likely candidates for involvement in the sustainability movement; therefore, it was some time before the two found a connection. Today, however, video games can be connected to the Green movement in two ways: through their form (because they consume energy) and through their content (which can be designed to teach and encourage Green ideas and practices).

As electronic devices that consume energy, home video game console systems should be turned off when not in use. A 2008 report from the Natural Resources Defense Council reported that many game consoles are left on continuously and that over 11 billion kilowatt hours a year of wasted energy, costing consuming over $1 billion, could be saved by turning them off (Horowitz 2008). According to the report, among the three seventh-generation consoles, the Nintendo Wii uses the least energy at 16 watts, the Microsoft Xbox 360 uses 119 watts, and the Sony PlayStation 3 (PS3) uses 150 watts. Sony does feature an online update that helps power management in the system, and both the Xbox 360 and the PS3 have auto-shutdown modes; however, these have to be enabled by the user.

Some companies designed their systems to be energy efficient. San Diego–based Zeebo Inc. produced the Zeebo console, which was aimed at consumers in emerging markets in Brazil, India, China, and Mexico. It used only one watt of power, making it by far the most power-efficient contemporary system. Packaging is another area where costs to the environment can be reduced. Pocketwatch Games' *Venture Arctic* (2007) is sold in "Go Green Packaging," which means 100 percent recycled materials and no plastic (Watson 2009). Like the music industry, some games companies have reduced the amount of packaging surrounding their products, and online distribution of games has eliminated the need for packaging altogether.

Games can also encourage the Green movement by teaching and embodying environmentalist ideas in an interactive, educational format. Some of the earliest games that could arguably be connected to the Green movement include *SimCity* (1989) and *SimEarth* (1990), which simulated environments and required players to manage resources to keep their cities and planets healthy. The design of *SimEarth* was even assisted by James Lovelock, author of the Gaia hypothesis, which looks at a planet's organic and inorganic elements as one big self-regulating system. Since then, a number of games have contained green themes, such as *Awesome Possum . . . Kicks Dr. Machino's Butt* (1993), in which players collect recyclable bottles and answer questions about the environment, and *Oddworld: Abe's Oddysee* (1997), which is about environmental destruction. One can also find green games that range from casual games, such as Nintendo's *Chibi-Robo Park Patrol* (2007) and National Geographic's *Plan It Green* (2009), to serious games, such as the urban-planning simulator *IBM CityOne* (2010), Red Redemption's *Climate Challenge* (2006), and *Fate of the World* (2011). Other games, like the experimental game *Flower* (2009), evoke green themes in more subtle ways, causing players to consider the natural world and our effects on it.

There is a growing awareness of environmental issues within the video game industry. In March 2019, the Fourth UN Environment Assembly included a "Playing for the Planet" panel discussion, which reported that "87 per cent of the 50 leading gaming companies demonstrate a deep commitment to making a change and are willing to support further action on this issue" (UN Environment Programme 2019). On September 23, 2019, twenty-one of the largest video game companies gathered at the UN Headquarters in New York during the UN secretary-general's Climate Action Summit and formally committed to take action to help the environment. Together they launched the Playing for the Planet Alliance.

Mark J. P. Wolf

Further Reading

Aslinger, Ben. "Video Games for the 'Next Billion'?: The Launch of the Zeebo Console." *The Velvet Light Trap* no. 66 (Fall 2010): 15–25.

Horowitz, Noah. *Lowering the Cost of Play: Improving Energy Efficiency of Video Game Consoles*. NRDC, November 2008. Available at https://www.nrdc.org/sites/default/files/consoles.pdf.

Playing for the Planet website. Accessed October 2, 2020. Available at http://http://playing4theplanet.org/.

UN Environment Programme. "Playing for the Planet: How Video Games Can Deliver for the Environment." April 23, 2019. Available at https://

www.unenvironment.org/news-and-stories/story/playing-planet-how-video-games-can-deliver-environment.

Watson, Stephanie. “What Is Green Gaming?” HowStuffWorks, January 27, 2009. Available at https://science.howstuffworks.com/environmental/green-science/green-gaming.htm.

Sweden

The first Swedish digital games were developed for the first computers installed at Swedish universities in the 1950s. As employees at state-run universities in a Western democracy, Swedish researchers had good ties to the United States and could share their inventions with developers overseas. Digital games were also created by the first Swedish computer manufacturers, such as DataSaab. These games were a fun distraction for engineers and scientists, but they were also utilized as a way to showcase the abstract capabilities of these early computers. Later in the 1970s, as games became more widespread, Swedish home electronics company Luxor produced Channel F consoles on a license from the American company Fairchild, but no games were developed especially for the Swedish domestic market.

A new generation of dedicated game developers emerged with the introduction of home computers in the late 1970s and early 1980s. Home computers meant a dramatic dispersion of the essential technology for game development. Outside the core hardware development countries, the United States and Japan, and with no Nordic electronics companies successfully venturing into computer or console manufacturing, home computers became a gateway for the establishment of a Swedish game industry. However, the first Swedish developers did not establish lasting companies in the still young and rapidly evolving market. Some of the developers were absorbed into the more mature British game industry that had been established alongside the early British computer industry. Swedish developer Bo Jangeborg moved to the United Kingdom and developed *Fairlight* (1985) and *Fairlight II* (1986) for British publisher the Edge Software. Jangeborg and other early developers eventually found other opportunities in the fast-growing software industry and left game development.

However, since the end of the 1980s and early 1990s, there has been an active and expanding game development industry in Sweden. A new generation of companies started out during this phase. Several had ties to the tech subculture surrounding the demoscenes. Companies such as Digital Illusions, Starbreeze, Unique Development Studios (UDS), Atod, Southend Interactive, and O3 Games all had their roots in different demo groups. The transition from amateur to commercial game development was not always straightforward, but the tech-savvy young developers had talent and an affinity for developing advanced computer games. One of the most successful Swedish companies, Digital Illusions (later DICE), started out from a demo group and eventually developed the innovative pinball game *Pinball Dreams* (1992) for the Amiga 500. The company later developed a number of racing games, but the true economic success came after the acquisition of the company Refraction Games and the subsequent venture into first-person shooter (FPS) games. The many *Battlefield* games have been the company's core game series.

The industry expanded rapidly during the dot-com bubble years at the end of the 1990s and up until 2001 and again from 2004 until the financial crisis around 2008. However, many companies had a rough time finding viable publishing contracts, and many were struggling with their profitability. One of the largest Swedish companies, Grin, failed in 2009.

The broader economic success of the Swedish game industry came with the new disruptive technologies of digital distribution and smartphones. A number of Swedish companies were able to utilize the new possibilities surrounding platforms such as Steam and iPhone or Android phones. The company King successfully entered the newly vitalized mobile phone market with the game *Candy Crush* (2012). Starbreeze had developed the critically acclaimed game *Chronicles of Riddick: Escape from Butcher Bay* (2004) but had larger economic success from extending the life span of its heist game *Payday 2* (2013) by using upgrades and selling multiple DLCs (downloadable content). However, the most striking Swedish success has probably been Mojang and its game *Minecraft* (2011). The company successfully used an early access business model. The game was not only a broad economic success but also became a global phenomenon with a large community, and influenced whole markets adjacent to gaming, such as online streaming. Mojang was sold to Microsoft in 2014. Several of the larger successful Swedish companies have been acquired in the same way by larger global game publishing companies and are no longer Swedish owned; DICE, King, Massive Entertainment, and MachineGames are owned by American or French multinational publishing corporations.

A wide ecosystem of smaller independent game developers producing a wide range of successful and acclaimed games have also developed alongside the larger Swedish companies. Coffee Stain Studios has developed the open-ended action game *Goat Simulator* (2014), Frictional Games developed the horror game *Amnesia: The Dark Descent* (2010), Arrowhead Game Studios developed the action-adventure *Magicka* (2011), Dennaton Games developed the ferocious top-down shooter *Hotline Miami* (2012), and Nifflas has developed a number of visually noteworthy 2-D adventure games, such as *Knytt* (2006) and *NightSky* (2011). With numerous other game developers, the Swedish game industry has established itself as one of the more prominent in Europe.

Ulf Sandqvist

Further Reading

Jørgensen, Kristine, Ulf Sandqvist, and Olli Sotamaa. "From Hobbyists to Entrepreneurs: On the Formation of the Nordic Game Industry." *Convergence: The International Journal of Research into New Media Technologies* 23, no. 5 (2017): 457–476.

Sandqvist, Ulf. "The Development of the Swedish Game Industry: A True Success Story?" In *The Video Game Industry: Formation, Present State, and Future*, edited by Peter Zackariasson and Timothy L. Wilson, 134–156. New York and London: Routledge, 2012.

Switzerland

The history of video game hardware and software in Switzerland mainly began in the context of universities. In 1976, at the Swiss Federal Institute of Technology in Lausanne (EPFL), Jean-Daniel Nicoud and his team built twenty units of the Smaky 4 model, the first Swiss made microcomputer, with financial help from the Swiss Federal Institute of Technology in Zurich (ETH-Zürich) and Digital Equipment Corporation, an American company. In February 1978, EPSITEC-system SA was founded with Cathi Nicoud at its head to sell the Smaky 6 model. The "Smaky" line (for SMArt KeYboard) was mainly aimed at schools from the French-speaking part of the country and thus included mostly educational computer software. Later, the Smaky line required a dedicated catalog of games, which led to the creation of the *Blupi* series (also known as *Eggbert* in the United States), mainly developed by Daniel Roux: *Toto à la maison* (1988), *Toto s'amuse* (1990), *Blupi Explorateur* (1993), *Blupimania* (1994), *Planet Blupi* (1997), *Speedy Blupi* (1998), *Blupi s'amuse* (2000), *Speedy Blupi II* (2001), and *Blupimania II* (2003). Following EPSITEC's design approach of considering video games as learning tools, Daniel Roux also created *CoLoBoT* (2001) and *Ceebot* (2002), two games meant to teach programming basics, and *Buzzing Cars* (2002).

Further north, in the German-speaking part of the country, some individuals from the Amiga enthusiasts and hackers scene had decided to develop their own games by the end of the 1980s. They worked mainly with LinEL, a Swiss publisher of both original games and ports on the Amiga line of personal computers. This led to an important Amiga-focused lineup of Swiss games, among which one can find *War Heli* (1987), *Ball Raider* (1987), *Crack* (1988), *Dugger* (1988), *Leonardo* (1989), *Clown'O'Mania* (1989), *Pamehta* (1989), *Antares* (1990), *Rolling Ronny* (1991), *The Game of Life* (1991), *Züri* (1992), *Traps'n'Treasures* (1993), and *Starbirds* (1996). Developed by Roman Werner, *Traps'n'Treasures* is the most remarkable of all, first and foremost because of its technical qualities and creative design but also due to complicated relations with the German editor Starbyte Software, which made the game become a rarity sought by collectors. The point-and-click adventure game *Züri* (1992) is also noteworthy in that it includes the Swiss city of Zurich for its realistic setting.

The Smaky line and EPFL aside, the Swiss Federal Institute of Technology in Zurich (ETH-Zürich) gave birth to one of Switzerland's most original projects. *The Last Eichhof* (1993) released on MS-DOS by an independent small group of students, Alpha Helix, is a freeware and open-source vertical shooter meant as a criticism of the standardization of the Swiss beer market that was threatening independent microbreweries like Eichhof, in Luzern. The player controls a spaceship shaped like an Eichhof bottle and fights against an evil empire of international beer brands. The group continued their game design activities on MS-DOS with the vertical shooter game *Ravage* (1996), this time with a less unconventional approach to the genre.

In terms of revenues, the *Farming Simulator* series by GIANTS Software, which started with *Farming Simulator 2008* (2008), constitutes Switzerland's most noticeable international economic success. The same know-how involved in designing successful, detailed, and factual simulation games was later observed in both *Train Fever* (2014) and *Transport Fever* (2016) by Urban Games.

Starting in 2010, Switzerland witnessed an accelerating shift from a fragmented and invisible game development scene to a connected, sustainable, benevolent, and expanding local industry. This was spearheaded by the support of Pro Helvetia, a state-funded public foundation, as well as many individual voluntary actions. The 2010s saw the artistic and institutional legitimization of the video game medium, illustrated by museum exhibits (La Maison d'Ailleurs, Aarau City Museum), festivals (Ludicious, GameZfestival, Numerik Games), and public workshops (Swiss Game Academy). During this period, many critically acclaimed Swiss games were released, which include *Moonga* (2010) by Everdreamsoft, *Dreii* (2013) by Etter Studio, *First Strike* (2013) by Blindflug Studios, *The Firm* (2014) by Sunnyside Games, *Feist* (2015) by Bits & Beasts, *Opticale* (2016) by Furinkazan, *Niche: A Genetics Survival Game* (2016) by Stray Fawn Studio, *Octahedron* (2018) by Demimonde Games, *Airships: Conquer the Skies* (2018) by David Stark, *Oniri Islands* (2018) by Tourmaline, and *Far: Lone Sails* (2018) by Okomotive.

Another example of the stabilization of the Swiss video game industry is the creation of the Swiss Game Developers Association (SGDA), whose mission is to represent the interests and voices of game developers in both political and cultural debates. Their work, in collaboration with national councillor Jacqueline Fehr, led to the March 2018 release of an official report by the Federal Council—the head of government and state in Switzerland—validating the cultural and economic potential of video games.

Four national languages and five bordering countries are unique elements that define Swiss culture, with diversity at its core. The geographical position of Switzerland, along with its cultural and linguistic diversity, stable economy, and strong academic infrastructures, makes it a land of promise and potential in terms of game design. If linguistic and cultural barriers hinder the production of narrative-based games, they invite game designers to break them down, emphasizing interactivity and visuals in minimalistic designs.

David Javet and Matthieu Pellet

Further Reading

Epsitec SA games official website. Accessed October 2, 2020. Available at http://www.blupi.org/.

Graber, Jan. *Vom Schweizer Hacker zum Gamedesigner*. 20 Minuten, September 4, 2013. Available at https://www.20min.ch/digital/games/story/Vom-Schweizer-Hacker-zum-Gamedesigner-22968445.

Javet, David. "*Floppy D!sk* (Joël Lauener, 2017): l'histoire du jeu vidéo en Suisse dans une disquette." *Décadrages: Cinéma à travers champs* no. 39 (Fall 2018): 128–135.

Javet, David, and Matthieu Pellet. "Switzerland." In *Video Games around the World,* edited by Mark J. P. Wolf, 535–543. Cambridge, MA: MIT Press, 2015.

Javet, David, and Yannick Rochat. "Jeux vidéo suisses: état des lieux (2012–2017)." *Culture en Jeu* no. 54 (April 30, 2017): 6–7.

Krichane, Selim. "Compte rendu de l'exposition Playtime—Videogame mythologies." *Décadrages: Cinéma à travers champs* nos. 21–22 (Fall 2012): 179–189.

Syria

The bloody civil war that began in 2010 and the resultant exodus of refugees will always overshadow the fact that Syria was the cradle of video game development in the Middle East. In September 2000, *Under Ash*, a PC-based first-person shooter (FPS) game, was previewed to the public at a Damascus book fair, and it was considered to be the first commercial video game in the Middle East based on the Palestinian conflict. Created by Radwan Kasmiya and published by Dar Al-Fikr in 2002, *Under Ash* targeted Arab gamers, did not contain English subtitles, and was never sold outside the region (although limited copies found their way to Europe unofficially). The game received a lot of praise and managed to sell more than one hundred thousand units within the first six months of release—a considerable quantity, even compared with internationally best-selling titles' sales in Middle Eastern markets. The success of the game naturally led to a sequel, and so Afkar Media was established and became the first independent game studio in the region.

During that time, another Syrian company, Techniat3D, developed *Zoya: A Warrior from Palmyra* (2002), an adventure game inspired by the *Tomb Raider* series. Sadly, the game sold fewer than a hundred copies in the region, and many claimed that the "improper attire" of the female warrior featured on the cover was the reason players avoided the game. A revised version was made by Afkar Media, and the game was rereleased as *Victory Castle*; however, this version did not meet with much success either, selling just over a thousand copies. Consequently, Techniat3D was closed down in 2003.

Two years later, *Under Ash II* (also known as *Under Siege*) was released in 2004 but did not hit the retail shelves until late 2005 because the publisher was trying hard to access new markets with little experience in simultaneous releases. *Under Ash II* was positively received because of its realistic storyline, advanced graphics, and artificial intelligence (AI) for the time. The game has been described as a "docugame" because all the levels are based on actual events documented by the United Nations' records from 1978 to 2004. This time around, the game also supported English subtitles.

The publisher decided to split the game into two parts to graze more money from enthusiastic gamers, so it released *Under Siege: Path to Freedom* and *Under Siege: Remnant of Human*. That said, the English version of the game, *Under Siege: Golden Edition*, was finally released in 2008; a strange tactic that was repeated later with *Quraish* (2005), the first Arabic real-time strategy (RTS) game, also developed by Afkar Media. *Quraish* was highly anticipated by Arab gamers because it was based on actual historical (conquest) wars during the early Islamic periods, a highly revered period in the region. The game was finally released commercially in 2008, after spreading its four campaigns on four independent package designs and one "Golden Version" with all the features.

In 2007, Spacetoon Media Group, a major kids' satellite channel in the Middle East, invested in a new studio to localize Chinese role-playing games (RPGs), and Game Power 7 was founded with a front office in Dubai and a production facility in Syria, where they introduced an Arabic version of *Rappelz* (2017), the first online Arabic localized game. Successful operation and deep localization were major factors that allowed this game to enjoy nearly one million registered users.

In 2008, the Syrian company JoyBox was established, focusing on the casual games and mobile games markets. It has produced many types of games, ranging from two-dimensional arcade-style games that are basically sold to Al-Majd (a local Quiz TV channel) to three-dimensional prototypes of adventure games and racing games.

Starting in 2009, after the global financial crunch and eight years of civil war, most Syrian studios were either closed or had to change their business models toward training or outsourcing. *Road to Jerusalem* (2009), a comedy/adventure computer game published by Fares al Ghad, was the last production of Afkar Media before political unrest forced most studios and their talent to leave the country and create the next generation of video games from the diaspora.

Radwan (RAD) Kasmiya

See also: Middle East; *Quraish*

Further Reading

Game Power 7 website. Accessed October 2, 2020. Available at http://gamepower7.com.

Games for Change. “Interview with Radwan Kasmiya of Afkar Media.” November 12, 2010. Available at http://www.gamesforchange.org/blog/2010/11/12/592/.

JoyBox Games website. Available at https://www.gamesforchange.org/blog/2010/11/12/592/.

Sisler, Vit. “In Videogames You Shoot Arabs or Aliens—Interview with Radwan Kasmiya.” *Umelec/International* 10, no. 1 (2006): 77–81. Available at http://uisk.jinonice.cuni.cz/sisler/publications/kasmiya.htm.

T

Television

Television receivers, more commonly simply referred to as TVs, have historically been used to receive broadcast, cable, and broadband programmed content, but television plays a key role in the history and culture of video games as well. Early video game innovator and inventor Ralph Baer was inspired to begin work on the first commercial home video game system because of the lack of compelling television programming available. Baer thought the technology could be used to do more and in more innovative ways. In this way, television gave rise to home video games, and it still remains a common venue for video games. Television also shares its technological structure with the infrastructure of arcade video games: the cathode-ray tube (CRT). Whether sunk into a wood-grained home case made to look like living room furniture or encased in a futuristic fiberglass cabinet (e.g., *Computer Space* [1971]), both television and video games rely on video technology and, historically, CRTs as the basis for their display of images.

Using standard audio and video connector cables, so-called console video game systems are designed to connect with television sets and must be played in some proximity to the television itself so that the handheld game controllers can connect physically or via wireless connection to the system and back to the television. This puts the gamer and gameplay in a limited physical space that is often defined by the placement of the television in a room. The advertising and press kits accompanying game systems—from the Atari VCS 2600 to the Nintendo Wii and the Microsoft Xbox Kinect—often promote the space around the television set as a zone for the shared familial pleasures of multiplayer gaming. As an "electronic hearth," like radio before it, television inscribes video games into the domestic space of the home. Recent systems, from the Xbox on, include interface components that allow gamers to switch easily between passive television programming, films, and gaming content. Some television programs even adapted games as narrative content, such as *Pac-Man: The Animated Series* (1982–83) and the *Super Mario Bros. Super Show!* (1989–91). Of course game adaptations of television programs are also common, especially games based on children's programming, such as *Dora the Explorer: Journey to the Purple Planet* (2005) and *SpongeBob SquarePants: Creature from the Krusty Krab* (2006). Adult-themed game adaptations of television programs run the gamut from *Home Improvement: Power Tool Pursuit* (1994) to *Buffy the Vampire Slayer* (2002) and *The X-Files: Resist or Serve* (2004).

With the expansion and convergence of screened entertainment in recent years, there are now serial programs about gaming culture developed online that have also been shown on television and released on DVD, such as the MMOskewering program *The Guild* (2007–13). Gaming structures, strategies, and scenarios are now commonplace in narrative television, with series like *Black Mirror* (2011–present) delving into the darker depths of gaming in episodic anthologies (see *Black Mirror* episodes “Playtest” [2016], “San Junipero” [2016], and “U.S.S. Callister” [2017] and the interactive feature “Bandersnatch” [2018]). *Black Mirror*’s “U.S.S. Callister” uses the premise of a contemporary game development company and its massively multiplayer online (MMO) game to simultaneously critique the culture of classic *Star Trek* television episodes. As this transposition of content across forms reveals, the shared space of the television screen has led to two distinct but complementary forms of entertainment. Increasingly, “television” is a reference point for understanding media across an environment of screened media, including computers, laptops, mobile phones, watches, and more. The television is no longer a specific device: it is an interface for understanding screens. Gaming and programming are two dominant ways to engage with television.

Despite all of these technological and cultural connections between video games and television, video games remain overlooked within the academic field of television studies, which focuses on television programming and industry rather than pursuing, like Baer, other uses of television for interactive entertainment. Recent work by video game scholars offers a corrective in this regard, resituating television in the history of video games as a crucial part of the video game system apparatus that includes game hardware, software, controllers, and audio and video elements. These last two, audio and video, are provided by the television set (possibly with the addition of ancillary sound systems incorporated into the setup as gaming systems and sound became more complex). Although home computer games are often reliant on a high-quality video card as part of a computer system, console-based home video games instead work with and on television’s graphic capabilities. TV’s influence in this regard is tremendous, from video game designers working with the graphic limitations of game hardware and 1970s television sets to design games that produced compelling graphics despite extreme technological constraints to the emergence of games designed to maximize the high-definition pleasures of contemporary television screens and the home theater audio systems that often accompany them.

Sheila C. Murphy

See also: Console-Based Games

Further Reading

Evans, Elizabeth. *Transmedia Television: Audiences, New Media, and Daily Life*. New York: Routledge, 2011.

Murphy, Sheila C. *How Television Invented New Media*. Piscataway, NJ: Rutgers University Press, 2011.

Seiter, Ellen. *Television and New Media Audiences*. London: Oxford University Press, 1999.

Tempest

Tempest is a coin-operated arcade game designed by Dave Theurer and released by Atari in October 1981. Theurer also designed the arcade games *Missile Command* (1980) and *I, Robot* (1984), among others. *Tempest* is a shooting game that features abstract three-dimensional vector graphics. Both *Tempest* and its cabinet art pick up on late twentieth-century popular anxieties related to alien invasion and the perpetual threat of technologically driven annihilation. Play occurs sequentially and repetitively through different "tubes," or playfields, increasing in difficulty over the course of the game's ninety-nine levels. There are sixteen different tube layouts, and these layouts are designed to evoke the sensation of peering into a geometrically outlined void (such as a circle, triangle, or plane). There are five types of enemies—Flippers, Tankers, Spikers, Fuseballs, and Pulsars—and each has its own distinct visual style and threat behavior. Enemies may be destroyed by a single shot from the player's avatar (the "shooter") or by the Superzapper, a limited use weapon capable of destroying all on-screen enemies at once.

Tempest's eye-catching imagery and fast-paced play were enabled by its Wells-Gardner Color X-Y Display vector monitor, and *Tempest* was the first arcade machine in the Atari line to include this technology. *Tempest* is also notable for its Skill-Step play system and Operator-Information Display. The Skill-Step play system is a precursor to the now omnipresent feature in video games of user-selectable difficulty, whereby the user determines a game's level of challenge prior to play (in *Tempest*, the player is able to begin at tube 1, 3, 5, 7, 9, or 11, according to preference). The Operator-Information Display is similarly prefigurative, tracking a variety of metadata, including average game time and total number of games played. Such data about gameplay have become staples in modern gaming, with collected information used by developers to refine design elements and prompt play by describing performance to the player as part of the game experience (such as displaying hit percentage, level completion time, enemy destruction, and so forth).

Tempest's iconography has been referenced in media of all types—from video games (e.g., *Space Giraffe* [2007]), to movies (e.g., *Night of the Comet* [1984]), to television shows (e.g., *The Simpsons* [2006])—and the game has been regularly rereleased in anthologies (e.g., *Atari Arcade Hits: Volume 1* [1999]) in the decades since its development. It is considered a landmark game by many game designers, players, and critics.

Judd Ethan Ruggill and Ken S. McAllister

See also: Arcade Games

Further Reading

Atari. *Tempest: Operation, Maintenance and Service Manual*. Sunnyvale: Atari, 1981.

Atari. *Wells-Gardner Color X-Y Monitor: Service Manual*. Sunnyvale: Atari, 1981.

Ruggill, Judd Ethan, and Ken S. McAllister. *Tempest: Geometries of Play*. Ann Arbor: University of Michigan Press, 2015.

Temporal Navigation. *See* Navigation (Temporal)

Tencent Holdings Ltd.

Tencent Holdings is the largest tech, digital, and social media platform company in China with its value reaching USD 522 billion, a value that surpassed Facebook (USD 519 billion) in 2017. Tencent owns the two largest social media platforms, or apps, in China, namely WeChat (1 billion monthly active users as of October 2018) and QQ (669.8 million users as of December 2018) (CIW Team 2018). With WeChat evolving into a multipurpose platform (Montag, Becker, and Gan 2018), covering the function of social media, payment, gaming, shopping, taxi ordering and finance, Tencent has been integrated into the daily life of the population, with more than one billion Chinese users; its content is highly censored and monitored by the Chinese government (Harwit 2016).

For a mixed purpose of propaganda, social control, and public relations, different departments and units of the government also set up official accounts on WeChat to influence public opinion. Despite the fact that WeChat drives lifestyle spending, with an estimate of USD 1.76 billion annually, and that it also carries advertising, as of 2017, Tencent's revenues still largely rely not on social media but video games, which account for 40 percent of its revenues. As one of the largest game companies in the world, with an annual revenue of RMB 237.76 billon (USD 21.9 billion) (Futter 2018; Statistia 2018), Tencent has become a major entertainment hub inside China. Outside China, where it is usually regarded as a form of China's soft power, Tencent also acquired major game companies, including Riot Games, which owns *League of Legends* (2009). On one hand, Tencent is powerful in terms of social influence, and this sometimes explains why the authorities also depend on Tencent for expanding their governance and influence. On the other hand, its finances are highly contingent on the popularity of the entertainment business, the content of which is constantly regulated by the Ministry of Culture. But the policies of the latter vary over time.

At the end of 2018, under the general banner of "over entertaining," which legitimizes the banning of sensational, immoral, and obscene media and online content for a period of six months, the State Administration of Press, Publications, Radio, Television, and Film ceased issuing licenses for new video games. As a result, Tencent suffered from an estimated loss of USD 200 billion in the game market during this period (Chan 2018). In general, Tencent exemplifies the operation of the content and creative industries in China: the state allows only a few players so that they are also guaranteed substantial profit, but they have to align with the state's interest in terms of content and the public discourse generated.

Anthony Y. H. Fung

See also: China

Further Reading

Chan, Cathy. “China Ends Freeze on Video-Game Licensing.” *Bloomberg*, December 30, 2018. Available at https://www.bloomberg.com/news/articles/2018-12-30/china-ends-9-month-freeze-on-video-game-licensing-ft-says.

CIW Team. “China’s Top Mobile News Feed Advertising Platforms in Oct 2018.” China Internet Watch, December 12, 2018. Available at https://www.chinainternetwatch.com/27654/top-mobile-news-feed-ads-platforms-oct-2018/.

Futter, M. “Tencent Isn’t Just Ubisoft’s Savior—It’s the World’s Biggest Game Company.” *Polygon*, March 29, 2018. Available at https://www.polygon.com/2018/3/29/17172326/tencent-ubisoft-explained.

Harwit, E. “WeChat: Social and Political Development of China’s Dominant Messaging App.” *Chinese Journal of Communication* 10, no. 3 (2016): 312–327.

Montag, C., B. Becker, and C. Gan. “The Multipurpose Application WeChat: A Review on Recent Research.” *Frontiers in Psychology*, December 11, 2018. Available at https://doi.org/10.3389/fpsyg.2018.02247.

Statistia. “Annual Revenue of Tencent Holdings from 2008 to 2019 (in Billion Yuan).” 2018. Available at https://www.statista.com/statistics/223649/revenue-of-tencent-holdings-since-2007/.

Technode. “WeChat’s Impact: A Report on WeChat Platform Data.” February 10, 2015. Available at https://technode.com/2015/02/10/wechat-impact-report/.

Tetris

The falling block puzzle game known as *Tetris*, which is world famous for its simple but addictive gameplay, is among the most popular games ever released. Around 1984, Alexey Pajitnov, a computer engineer from the Computer Center of the Russian Academy of Sciences, developed the game on an Elektronika 60 terminal computer. His colleague Dmitry Pavlovsky assisted him, and Vadim Gerasimov, a teenage student at the time, ported the game to the IBM PC. From there, a PC version burst into popularity and began spreading around Moscow and then Western Europe.

At the time, *Tetris* was not patented. In the former Soviet Union, intellectual property rights were not established for private individuals, and private business was prohibited. This situation eventually generated considerable profits for various businesses and people, which caused a number of conflicts. In 1986, before any legal rights were established, Spectrum HoloByte released an IBM PC version of *Tetris* in the United States. Its license was obtained from a London publisher, Andromeda, who was licensing rights that were unofficially acquired by Novotrade, a company from Budapest. Other versions also flourished before 1988, when the Soviet government began to market the *Tetris* trademark and granted Pajitnov paternity over it. A year later, licenses were signed over to Atari, for the arcade version, and to Nintendo, who soon bundled *Tetris* with every Nintendo Game Boy console.

Up until 1996, Pajitnov had made almost no money from the game, despite

Nintendo’s commercial success with it. Because of the nature of communism, Pajitnov had to wait until the rights were fully returned to him from the Russian state to collect money for his achievement. Today, the Tetris Company cofounded by Pajitnov owns the trademark and maintains the “Tetris guidelines.” It standardizes basic parameters, such as the size of the playfield and the control keys and the hues, which vary from monochrome or grayscale graphics to several colors for each of the distinct shapes present in the game.

Tetris’s seven game pieces are tetrominoes, each composed of four adjoining squares arranged in a different way; the game’s name comes from combining the words *tetromino* and *tennis* (even though it sounded somewhat strange in Russian, Pajitnov insisted on it). The seven tetrominoes are identified by their shapes: O or square, J or leftgun, L or rightgun, I or dash, Z or leftsnake, S or rightsnake, and T or tee.

A boy plays a version of *Tetris* on a tablet computer. (Vladimir Stanišic´/Dreamstime.com)

Tetris’s core gameplay involves rotating the falling tetrominoes and fitting them together in rows. Points are awarded when rows are completed, and completed rows disappear, allowing the other rows to drop down and giving the player more room to manipulate the falling tetrominoes. The tetrominoes enter from the center of the upper boundary of a rectangular grid ten bricks wide by twenty bricks high. Some versions of the game feature a window showing what kind of piece will appear next, allowing players to anticipate what moves to perform. Each tetromino can be pivoted in ninety-degree increments, translated horizontally, or “dropped” hastily. As players react by reorienting falling pieces in search of the best positioning, they mentally represent the shapes using both mental rotation skills and spatial visualization skills, both of which improve over time.

The game's difficulty results from the pieces piling up as well as the increasing rate at which they fall, both of which reduce the amount of time the player has to manipulate and position the pieces. Although every piece can complete one or two rows when it is the last to be added to a row, the I, J, and L pieces, which all have at least three blocks in alignment, are able to clear three rows. Only the I tetromino is capable of clearing four lines simultaneously, and this action is referred to as a *tetris*. Many versions of the game also award additional points based on the height and speed of the falling piece.

When a finished row disappears, the stacks above it cascade and fill the newly created negative space as well as other possible openings under it. Traditional versions of the game move the piles of blocks down by a distance equal to the exact height of the cleared lines below them, and rows often must be cleared to reach the unfilled gaps beneath them.

The player's objective is to maximize the number of points gained over the course of the game. Doing so requires clearing as many rows as possible to open the way for the never-ending fall of new blocks and to avoid running out of space vertically. When this happens, it is the end of the game, known as *topping out*.

Frequently hailed as one the best video games of all time as well as the most ported in the history of video gaming, *Tetris* has also been the focus of documentaries and a prevalent subject in academic research. Vladimir Pokhilko, a friend of Pajitnov, was the first clinical psychologist to conduct experiments using the game, only a few years after its creation. Since then, it has been used in several fields, including the theory of computation, the algorithmic theory of games, and cognitive psychology. It is also a widely used example in new media and game studies, where different readings of *Tetris* also gave birth to a classic conflict between simulation and narrative. Gonzalo Frasca sees the game as entirely nonrepresentative, an abstract environment where players test their skills (Frasca 2001). In contrast, Janet Murray sees a specific narrative: "a perfect enactment of the overtasked lives of Americans in the 1990s" (Murray 1997). However, according to Marie-Laure Ryan, that narrativity is of the lowest degree because it is "hardly interpretable as the pursuit of human interests in a concrete situation" (Ryan 2001).

Vincent Mauger

See also: Abstraction; Game Transfer Phenomena; Russia

Further Reading

Demaine, Erik D., Susan Hohenberger, and David Liben-Nowell. "Tetris Is Hard, Even to Approximate." In *Computing and Combinatorics: 9th Annual International Conference COCOON 2003*, Big Sky, MT, July 25–28, 2003, *Proceedings*, edited by Tandy Warnow and Binhai Zhu, 351–363. Heidelberg, Germany: Springer-Verlag, 2003.

Frasca, Gonzalo. *Videogames of the Oppressed: Videogames as a Means for Critical Thinking and Debate*. Master's thesis, Georgia Institute of Technology, 2001. Available at www.ludology.typepad.com/weblog/articles/thesis/FrascaThesisVideogames.pdf.

Gerasimov, Vadim. *Tetris Story*. Accessed September 25, 2020. Available at http://vadim.oversigma.com/Tetris.htm.

Hoogeboom, Hendrik Jan, and Walter A. Kosters. "Tetris and Decidability." *Information Processing Letters* 89, no. 6 (2004): 267–272.

Johnson, Bobbie. "How Tetris Conquered the World, Block by Block." *The Guardian*, June 2, 2009. Available at https://www.theguardian.com/technology/gamesblog/2009/jun/02/tetris-25anniversary-alexey-pajitnov.

Murray, Janet. *Hamlet on the Holodeck: The Future of Narrative in Cyberspace*. Cambridge, MA: MIT Press, 1997.

Ryan, Marie-Laure. "Beyond Myth and Metaphor—The Case of Narrative in Digital Media." *Game Studies* 1, no. 1 (2001). Available at http://gamestudies.org/0101/ryan.

Salen, Katie. "Tetris: Puzzling Architecture." In *Space Time Play: Computer Games, Architecture and Urbanism: The Next Level*, edited by Friedrich von Borries, Steffen P. Walz, and Matthias Böttger, 52–53. Basel, Switzerland: Birkhäuser, 2007.

Tetris Effect. *See* Game Transfer Phenomena

Text Adventure Games

Text adventure games (also text games or text-based games) are video games known for their minimal requirements of computer processing and storage due to the exclusive usage of text characters in their presentation of rules and universe (through written descriptions or ASCII art). Today, this genre also encompasses hyperlink or multiple-choice fictions that can be found on the internet. The concept behind the genre is to present players with textual content that provides an idea of their surroundings and is scattered with accentuated keywords to be used during the game experience and toward which they are invited to express action commands to interact with the created world.

Text adventure games contain a narrative framed within a theme (occasionally based on popular franchises) and a main character, controlled by the player, who must fulfill a specific role in the story. Armed with this information, players have a better grasp of the actions they can perform in the game, thus helping the illusion of total freedom that is proposed by the open text entry field generally used as an interactive interface in this type of software. Most text adventure games use algorithms with databases to allow for word or choice recognition during communication with the player, and many also use a parser to analyze basic sentence structure. The function of these systems is to interpret the player's words and express their consequences by displaying them using dramaturgical tones. Most commonly made to make players aware of their current state, the game results will furthermore be modified according to different diegetic contexts. One of the obstacles to this human-machine communication is its reliance on very specific vocabulary (sometimes listed in a help file) that often creates gaps between the level of language that is asked of players (verb-noun combination) and the one used in return to players' requests (correct or even literary).

The common factors in the games of this genre reside in their presentation (as the genre's name would have it) and the requirement for players to complete some form of puzzle, with or without random factors, to reveal and explore the storyline. Some text adventure games, typically called *interactive fiction*, principally place their focus on the literary content of their proposition, reducing the importance of puzzle completion for the unveiling of the story. Comparable to novels, these games are often recognized as a separate category with greatly detailed character depictions and realistic dialogue, whereas the others use more advanced gameplay with complex interface elements, such as blinking words, colors, interactive maps, and scoring, among others. At their core, much as is the case for books, interactive fiction relies on immersion through the way a story is conveyed and a world is described, which encouraged the production of well-written games such as *Trinity* (1986) and *Varicella* (1999). As for other text adventure games, some would argue that their immersion is mainly challenge based, sometimes to the point of giving the genre a reputation for being of an utmost difficulty (partly because of unforgiving and unpredictable consequences that can be experienced in such titles as *Planetfall* (1983) or *Hitchhiker's Guide to the Galaxy* (1984), both of which are purposefully misleading and threaten the player with restarting the entire game as a result of failure or the simple misunderstanding of the events).

Using mostly their imagination, players might also require the use of notes and visual mapping tools for their exploration and recollection of keywords during the many side scenarios and humorous events planned by the author. Acquiring knowledge and remembering the world are the phenomena on which text adventure games base their concept of freedom of action and sense of immersion. Online multiplayer versions of text adventure games, called MUDs (multiuser dungeons [or dimensions or domains], occasionally referred to as *interactive realities*), such as *Gemstone* (1988), *Darker Realms* (1990), or the original game *MUD* (1978), are also built to facilitate a sense of belonging through more natural conversations and exchanges between players, following the same general graphical context as their predecessors, but combining elements of many other different genres of video games, such as role-playing or hack-and-slash.

HISTORY

Before the support of computer graphics, game designers were forced to get creative and sketch their worlds only from green or orange letters on dark monitors, either through written descriptions or by constructing representations using only letters and symbols from the ASCII character set (as in *Rogue* [1980], from which the video game subgenre *rogue-like* originated). As an answer to this situation, text adventure games first appeared as a way for role players to share with others their tabletop role-playing game experiences by programming a computer-controlled "dungeon master" (with references to Dungeon & Dragons (1974), mainly inspired by fantasy universes). In 1976, *Colossal Cave Adventure* was designed by spelunker Will Crowther and became the game generally recognized as the origin of the genre, despite Peter Langston's mainframe games *Wander* (1974) and *Castle* (1974), which fell into obscurity until their rediscovery in the 2010s. *Colossal Cave Adventure* would be extended by Don Woods to become *Adventure* (1976), which quickly spread, spawning the text adventure game genre.

The most commercially successful interactive fiction of this time was Infocom's *Zork* (1977), which had multiple rereleases and sequels through 1986. In 1978, with the explosion of the personal computer market, text adventure games became widely published and marketed (through magazines and mail services), starting with Scott Adams's *Adventureland* (1978). These games introduced many influential video game features, such as mailed-to-home games (*Adventure International*, 1978), bonus material (e.g., sunglasses, game codes, and invisible ink booklets called InvisiClues by Infocom [1984]), packaging, narrator characters, and cliff-hangers teasing upcoming sequels (all originating from the passage of *Zork* to *Zork II* [1981]).

Later on, with graphics becoming a viable option, many text adventure designers included visual support, sometimes without considering whether it was necessary or what consequences it would have on the genre. Starting with Roberta Williams's *Mystery House* (1980), text adventures with graphics appeared, and games such as Sierra Entertainment's *King's Quest* (1984) became popular. This evolution continued until text was gradually subsumed into the diegesis (in the manner of books offering in-game lore for *Myst* [1993]) or were solely used for character dialogue interaction (as used in *Maniac Mansion* [1987]), slowly becoming the genre of point-and-click games that is most common today (as can be seen with the evolution of the aforementioned *King's Quest* series from 1984 to 2015).

Despite this, text adventure games expanded to a variety of other platforms and markets through the years. They were sold in bookstores, fused with chat room services for their gamification, were hidden inside other software as Easter eggs (e.g., the text adventure game within the Google search engine developer's console or the adapted version of *Dunnet* (1982) that can be found in the Terminal of every MacOS), and became the object of communities (e.g., Textadventures.co.uk and Interactive Fiction Database [IFDB]) and fan clubs that ported these games (through emulation systems such as the Z-machine, developed by Infocom in 1979) on mobile applications, websites, and different hardware supporting the format (such as *Dark Mage* (2003), which was originally made for the Atari 2600 but was adapted in 2004 for the TI-83 graphic calculator).

That said, the movement for new text adventure games never entirely disappeared. On platforms such as Kickstarter and Steam, inspired developers are raising interest in the genre once again, drawing from new features, such as reactive visual surrounding environment (as seen in *The House Abandon* [2016]), episodic narrative, animated puzzles (as shown in *Code 7* [2017]), sound effects, music soundtracks, and voiced narrative (as can be experienced in *The Lost Legends of Redwall: Escape the Gloomer* [2018]). Additionally, nostalgia being one of the main factors in this revival, the minimal requirements of processing and storage is allowing adaptations to e-book readers and tablets and profits from a new category of casual gamers participating in interactive fiction as a newfound interest. The free open market of e-book publishing has also inspired communities of hobbyists to produce a profusion of tools (e.g., Twine and Inklewriter) that allow anyone to create such games for competitions, interactive media exhibits, in honor of their favorite franchise, or simply for their personal pleasure.

The genre of text adventure games has shown a great amount of resilience over the years with its possibilities of adaptation and accessibility, its low material requirements and open-endedness, its simplicity while being challenging, and, of course, its nostalgic attributes, which tend to indicate its predisposition for survival over time. Throughout forums and blog posts, a new portrait of text adventure games can be drawn. Multiple contexts show an interest and potential for the integration of the genre into tools and environments of different circles, from classrooms (as demonstrated by the website of Studio Code) to traditional media companions (such as *Interstellar* [2015]). In parallel, more intelligent parsers are being tested, and machine learning's capacity for language and decision making are developing, ultimately aiming to accomplish a more complete and natural communication experience, possibly tracing the arrival of a new important subgenre: spoken-word games (paired with and transformed as interactive audiobooks by personal assistant technologies such as Google Home, Siri, and Alexa). In the years to come, it would be reasonable to expect text adventure games composed essentially of computer-generated storytelling algorithms to be all around us, therefore mimicking and demonstrating the needs and roles of the "dungeon masters" that first gave birth to the genre.

Jonathan Bonneau

See also: Adventure Games

Further Reading

Bartle, Richard. *Designing Virtual Worlds*. San Francisco: New Riders, 2003.

Barton, M., and B. Loguidice. *Vintage Games: An Insider Look at the History of Grand Theft Auto, Super Mario, and the Most Influential Games of All Time*. Waltham, MA: Focal Press, 2009.

Hansen, D. *Game On! Video Game History from Pong and Pac-Man to Mario, Minecraft, and More*. New York: Feiwel & Friends, 2016.

Jackson-Mead, K., and J. R. Wheeler. *IF Theory Reader*. Boston, MA: JRW Digital Media, 2011.

Montfort, Nick. *Twisty Little Passages: An Approach to Interactive Fiction*. Cambridge, MA: MIT Press, 2003.

Murray, Janet. *Hamlet on the Holodeck: The Future of Narrative in Cyberspace*. New York: Free Press, 1997.

Thailand

In 2018, Newzoo's 2018 Global Games Market Report ranked the Thailand market as twentieth by game revenues. The market is expected to top USD 2 billion (66.2

billion baht) in 2025, up from USD 597 million in 2017, sustaining an average yearly growth of 15 percent. In 2017, Thailand had 28 million gamers, and 1.2 million of them are hardcore gamers. There are also thousands of esports gamers. In 2017, the market for mobile gaming topped USD 46.1 billion, and the total revenue generated by the ten top-grossing iOS and Google Play games grew 85 percent year over year. The PC gaming market is expected to account for 15–20 percent of the Thai video game market in 2017, up from 6 percent last year. The surge in market share was fueled by competition among computer makers, driving down the price of gaming computers. The average gaming notebook, formerly selling in the upper 30,000 baht range, now goes for under 25,000 baht.

HISTORY

The history of video games in Thailand includes arcade games, console-based games, PC and LAN games, and online games. Arcade games have been imported into Thailand from Japan since 1993 by the Galaxy Group Thailand Company. Console-based games have existed since Atari launched the Atari VCS 2600 home console system in Thailand in 1977. The Super Nintendo Entertainment System (SNES) (also known as the Super Famicom) was very popular in Thailand because Nintendo provided additional devices, such as the Nintendo Super Scope and the Power Glove, and had a wide range of games available, such as *Final Fantasy II* (1988), *Final Fight* (1989), *Super Mario World* (1990), *NBA All-Star Challenge* (1992), and *Dragon Ball Z: Super Butōden* (1993); players could play pirated copies of these games on 3.5-inch diskettes by using “Pro” devices. The Sony PlayStation was very popular because of its graphics and the pirated CD-ROMs of the systems’ games that were sold in Thailand.

The 2000s were a time of warring next-generation console systems after three big companies released their new systems: the Sony PlayStation 2, launched on March 4, 2000; the Microsoft Xbox, launched in the United States on November 15, 2001; and the Nintendo GameCube, launched on September 14, 2001. Finally, PC and LAN games such as *Warcraft: Orcs & Humans* (1994), *Command & Conquer* (1995), *Diablo* (1996), and *StarCraft* (1998) attracted many Thai gamers. Online games, such as Gravity’s *Ragnarok Online* (2002) from Korea, which was sold by Asiasoft Thailand, were also very popular.

THE VDO (VIDEO) GAME INDUSTRY IN THAILAND

Today, due to the progress of computer technology, the internet, and Thai education, some Thai game players have become game developers and started their own companies. Debuz, TumGame Company Limited, Samart Corporation, Play Thai, and AIM Advance are examples of such new companies. A games market is growing, and educational programs of game development are now offered in some Thai universities, such as Mahidol University, King Mongkut’s University of Technology Thonburi, and Sripathum University. Also, the Software Industry Promotion Agency (Public Organization) (SIPA), now called the Digital Economy Promotion Agency (DEPA), is a Thai government agency that promotes and supports the development and marketing of software and digital content. The Thai Game Software Industry Association encourages Thai game companies to work together to share knowledge and experience and gain negotiating power.

PROBLEMS AND OBSTACLES

Video game development in Thailand faces three main problems or obstacles. As it is now the age of online games, the infrastructure of information and communication technology (ICT), often used as an indicator of a country's competitiveness, is used for ranking by the World Economic Forum (WEF), and the International Institute for Management Development (IMD) also plays a crucial role. The results reveal that Thailand is far behind other countries. The number of users of broadband, and computers in general, is lower in Thailand than in other countries. Thais are mainly users, not technology developers. Also, the political situation in Thailand is not stable; the government changes too frequently, which means that policies change, too. The ICT law for digital money or cybersecurity has not been delivered, so neither users nor developers are secure. Although the number of internet users, such as those using social media, is growing, there is much abuse, including online bullying, intellectual property violations, and the infringement of privacy.

Presently, video games in Thailand are not for entertainment or playing for fun; they are esports for which players receive big rewards and great salaries. Thus, an increasing number of Thai gamers and teams are competing in national and international arenas. The Thai video game industry is growing and appears to have a bright future.

Songsri Soranastaporn

Further Reading

Jarean, D. "Obstacles for ICT Competitive Development of Thailand." *MBA Magazine*, July 19, 2017. Available at https://news.mbamagazine.net/index.php/people/intelligent-network/item/167-ict.

Soranastaporn, Songsri. "Thailand." In *Video Games around the World*, edited by Mark J. P. Wolf, 545–564. Cambridge, MA: MIT Press, 2015.

thatgamecompany

University of Southern California students Jenova Chen and Kellee Santiago founded the independent video game development company thatgamecompany on May 15, 2006. From the beginning, the company has been highly successful in developing several games with thitherto rather innovative elements in international game development; the games produced by thatgamecompany stand out because they attempt to provoke (positive) emotional responses from players. This means, among other things, that the games are characterized by a kind of specific flow in the gameplay that is considered lenient or relaxed by many players. To date, the company has produced and released *flOw* (2007), *Flower* (2009), and *Journey* (2012). In 2012, Kellee Santiago left the company. At the time of this writing, in 2019, thatgamecompany consisted of about thirty team members, and a new game, *Sky*, is being developed.

One of the company's characteristic approaches in developing a new game is that it sets out to first decide on the range of emotions the new game is intended to provoke. This, of course, differs substantially from the most popular approaches in the game development industry, where developers often approach a new game with reflections on game mechanics, genre details, or aesthetics. Both cofounders, Chen and Santiago, stressed in several interviews that the company wishes to design creative games that trigger emotional responses in the players, especially optimistic and positive feelings as opposed to excitement and fear, which, in the cofounders' eyes, are rather characteristic for popular games overall. With this, thatgamecompany has also set out to change the video game industry and provide intuitive and innovative games. It is a declared intent of the company not to produce blockbuster games with a big budget, as, according to Chen, financial pressure could stifle innovation.

The first game released by the company was a PlayStation 3 version of *flOw*, which was based on an earlier game with the same name that had been developed by the cofounders and a team as part of student project. It became the most downloaded game on the PlayStation Network in 2007. After this, *Flower* equally claimed critical praise. The game won several awards, including Best Independent Game of 2009, at the Spike Video Game Awards. *Journey* (2012) continued the success story of the company and was even more successful than its predecessors. The game's innovative use of music (instead of language) as a communication tool within gameplay was particularly praised by critics.

Xenia Zeiler

See also: Chen, Jenova

Further Reading

Alexander, Leigh. "Changes at Thatgamecompany: Santiago Departs, New Game Underway." Gamasutra, March 29, 2012. Available at http://gamasutra.com/view/news/163491/Changes_at_Thatgamecompany_Santiago_departs_new_game_underway.php.

3-D Hardware

Video game consoles and personal computers use internal 3-D visual effects cards and external 3-D devices to create increased depth of field within game spaces. This entry focuses on the external forms of 3-D hardware that create stereoscopic 3-D images. The term *stereoscopic* comes from the word *stereopsis*, which refers to the visual effect that occurs when two corresponding images are simultaneously presented at strategic angles and decoded through special frames to create the illusion of z-axis depth.

The stereoscopic 3-D process makes images appear in front of or behind a screen, despite their projection or presentation on a screen. This process is possible because of the distance between the viewer's eyes. Each eye has a different perspective on the world. Differences between the two views work as depth cues for the brain, which automatically converts this information into a focused image. The eyes perform two essential tasks as part of this process. They focus and converge on objects by turning at complementary angles. The stereoscopic 3-D process disrupts this activity by providing different depth cues for each eye. The brain compensates for this difference and brings the image into focus at an illusory point of convergence.

Stereoscopic 3-D hardware produces two corresponding images on a screen in different formats or presents separate images for each eye side by side. There are a number of ways that hardware for 3-D video games can combine the separate input images into one stereoscopic image. Tabletop games created by Coleco and Bandai created the stereoscopic effect by positioning a half-silvered mirror inside the hardware to superimpose one reflected video display over another transmitted video display. Both game consoles licensed SEGA's *Zaxxon* (1982) title to promote their 3-D hardware.

Another way to achieve the stereoscopic effect is to present the right and left images in an alternating sequence that is synced to the separate right and left eye shutters on the viewer's glasses. The earliest 3-D video game to appear in arcades was SEGA's *SubRoc-3D* (1982), and it used a shutter mechanism to achieve the stereoscopic effect. To experience the 3-D effect of *SubRoc-3D*, the user placed his or her face into a "periscope" eyepiece. The eyepiece partitioned the player's view and delivered individual images to each eye. Inside the eyepiece, a mechanism controlling two synchronized disks modified the flickering images on the screen to create a shutter-based 3-D illusion.

During the early part of the 1980s, shutter-based 3-D video game hardware began making its way to the home entertainment market. In 1983, the GCE/Milton Bradley Vectrex video game system developed a peripheral device known as the Vectrex 3-D Imager. The 3-D illusion was created by an eyepiece similar to the *SubRoc-3D* "periscope." The eyepiece plugged into the Vectrex system and synchronized a spinning disk inside the eyepiece to correspond with the images on the screen. In 1987, 3-D peripherals for home entertainment systems, including Nintendo's 3D System Scope and Adaptor and SEGA's 3D Glasses and later the SEGAScope 3-D, created a similar effect using liquid crystal lenses that were darkened and lightened to correspond with the alternating images on-screen, separating the images sent to the player's eyes to create the stereoscopic effect.

Also in 1987, anaglyph 3-D hardware was used to create a stereoscopic 3-D effect by presenting images in two colors (usually red and cyan) that were decoded by glasses with corresponding colors. The anaglyph mode of 3-D was one of the most common types of 3-D hardware throughout the 1980s, 1990s, and 2000s. The only hardware required for this 3-D process is a pair of anaglyph 3-D glasses and a game that presents its images in an anaglyph form. Examples include *3-D Worldrunner* (1987), *Rad Racer* (1987), and *JJ* (1987), all produced by Square for the Nintendo Entertainment System (NES). Other anaglyph games include *Orb 3D* (1990), *Jim Power: The Lost Dimension in 3-D* (1993), *Magic Carpet*

(1994), *Descent* (1995), *Duke Nukem 3D* (1996), *Sly 3: Honor among Thieves* (2005), *G-Force* (2009), *Toy Story Mania!* (2009), and *Skate 2* (2009). The anaglyph 3-D process never attained widespread popularity because the 3-D images are rarely sharp enough to sustain prolonged viewing.

In 1995, Nintendo developed a unique portable 3-D video game system, the Nintendo Virtual Boy. Advertised as "so advanced it can't be viewed on conventional screens," the Virtual Boy system displayed a monochromatic red 3-D image. The 3-D illusion was produced by separating the player's eyes inside the eyepiece. Each eye was given its own view of a red LED screen regulated by oscillating mirrors. The movements of the mirrors were coordinated so that the two images could be used to create a 3-D illusion.

Since the turn of the twenty-first century, more sophisticated 3-D shutter glasses have been developed to work in tandem with emitters or software for video game consoles (most prominently the Nvidia 3D Vision technology). Typically, emitters sit on top of a 3-D television and sync the shutter speed of the dual-image presentation to the shutter speed of the two lenses on the glasses via radio waves or infrared signals. Alternatively, the software works in tandem with the glasses to regulate the opacity of the lenses. The lenses open and close at a shutter speed that corresponds to the alternating images on the screen, separating what each eye sees and creating the 3-D illusion. Games such as *Gran Turismo 5* (2010), *James Cameron's Avatar: The Game* (2009), *Super Stardust HD* (2-D version, 2007; 3-D version, 2010), and *Wipeout* (2010) used this hardware.

Autostereoscopic 3-D technology makes glasses unnecessary through the inclusion of an additional screen in front of the screen known as a *parallax barrier*. The parallax barrier separates the image for the viewer and creates the 3-D effect without the assistance of 3-D glasses. The Nintendo 3DS (2011) made this autostereoscopic 3-D experience available to mobile gamers. Popular games such as *Mario Kart 7* (2011), *Super Mario 3D Land* (2011), and *Pokémon Sun and Moon* (2016) take advantage of the 3-D capabilities with various levels of success. *Super Mario 3D Land* is particularly applauded for its ability to translate the beloved aspects of the franchise into a 3-D experience.

The lessons and innovations of 3-D hardware have paved the way for virtual reality (VR) technology. Although VR technology has struggled to penetrate the consumer market, a number of companies have produced VR headsets, including Oculus, PlayStation, Samsung, and HTC Vive, in the hopes that gamers will embrace immersive gameplay. Increasingly, these technologies enhance the effects of 3-D hardware by pairing the visual component with motion controllers and gesture-based game mechanics. While gesture-based gameplay has been available since the Nintendo U-Force (1989), the technology only achieved widespread adoption in the early 2000s thanks to the Nintendo Wii (2006), PlayStation Eye (2007), Microsoft Kinect (2010), and PlayStation Move (2010). PlayStation VR (2016) evolved from this earlier technology and features games such as *Rez Infinite* (2016), *Astro Bot Rescue Mission* (2018), and *Tetris Effect* (2018). In reviews, the game experience is often described as unique, disorienting, and transporting.

Ethan Tussey

See also: Graphics; Immersion; Virtual Reality; Z-Axis Depth

Further Reading

Benoit, Ilicia, and Eric Kurland. "The History of Stereoscopic Video Games for the Consumer Electronic Market." *Electronic Imaging, Stereoscopic Displays and Applications XXIX* (2018): 290-1–290-7(7).

Hayes, R. M. *A History of Filmography of Stereoscopic Cinema*. Jefferson, NC: McFarland Publishers, 1989.

Kulshreshth, Arun K., and Joseph J. LaViola Jr. *Designing Immersive Video Games Using 3DUI Technologies*. Berlin, Germany: Springer, 2018.

Nitsche, Michael. *Video Game Spaces: Image, Play, and Structure in 3D Worlds*. Cambridge, MA: MIT Press, 2009.

Salen, Katie, and Eric Zimmerman, eds. *The Game Design Reader: A Rules of Play Anthology*. Cambridge, MA: MIT Press, 2005.

3DO Interactive Multiplayer

Trip Hawkins founded Electronic Arts (EA) in 1982. As the chairman of the most powerful entertainment software publisher at the beginning of the 1990s, he was well aware of the challenges faced by the video game industry. Hawkins sought to alleviate the development process and reduce confusion for prospective buyers. He proposed a new vision for the industry: the creation of a single technological standard that could be licensed to multiple manufacturers. At the same time, Hawkins wanted to create a cutting-edge multimedia system that could play games with three-dimensional graphics and video, along with educational software, movies, and music CDs. In 1992, Hawkins introduced this ambitious vision of convergence to the public: the 3DO Interactive Multiplayer (or 3DO) was being sketched, and a new company was founded to develop the project.

Along with Commodore's CDTV, the Philips CD-i, and the Fujitsu FM Towns Marty, the 3DO was one of the first entertainment units to feature a built-in CD-ROM drive. When it launched in October 1993, it was the most powerful gaming system available. The console was based on a 32-bit RISC (reduced instruction set computing) processor running at 12.5 MHz, assisted by two video coprocessors running at 25 MHz. On top of the two megabytes of system RAM, another megabyte was dedicated to graphics, and its 2X drive could transfer up to 300 kilobytes of data per second. The system was able to display 24-bit color images (16 million colors) at a theoretical maximum resolution of 640-by-480 pixels (most games used the 320-by-240 standard). Thanks to the system's graphical processors, these images could be made transparent, warped, or applied as a texture on a three-dimensional surface. The 3DO was also proficient with full-motion video (FMV), and an extension, the Digital Video Module released in 1994, allowed the playback of movies on CDs.

In the early 1990s, Hawkins managed to create a lot of enthusiasm for the 3DO. Major manufacturers such as Matsushita/Panasonic, Goldstar, and AT&T were willing to invest in the venture, each planning to develop their own version of the system. Hawkins also convinced over fifty companies to sign developing agreements by loosening the restrictions and fees ($3 licensing fee per game sold, vs. $9 or $12 for the competition). However, the suggested price of Panasonic's FZ-1 ($699.95), the first 3DO to be manufactured, tainted this early confidence with doubt. Few consumers were willing to pay the price, and very few games were available upon release; Hawkins's venture was awarded "worst system launch" in *Electronic Gaming Monthly*'s annual contest. In 1994, the console received the "best product of the year" award from *Time* magazine. However, growing notoriety, the release of quality games, and a price cut down to $399 were not enough to increase sales. As John Markoff of the *New York Times* observed, at the end of 1994, the 3DO was already facing a make-or-break season (Markoff 1994). Production of 3DO hardware and games stopped after 1996.

The console was at the forefront of the short-lived interactive movie craze. Many of the FMV games, such as *MegaRace* (1994), *Microcosm* (1994), *Night Trap* (1994), *D* (1995), and *The Daedalus Encounter* (1995), were technically superior on the 3DO. Several space shooting games were released throughout the system's three-year life span, either shooting galleries on rails that heavily relied on prerendered courses (such as *Star Wars: Rebel Assault* [1994] and *Novastorm* [1994]) or real three-dimensional games such as *Wing Commander III: Heart of the Tiger* (1994), *Total Eclipse* (1994), and the *Shockwave* series made exclusively for the console. Crystal Dynamic's *Gex* was proclaimed 3DO's mascot upon its Christmas 1994 release, but the title would later be ported to other systems.

In 1994, the sport simulation genre started a successful transition to three-dimensional graphics and TV-style presentation with EA's *John Madden's Football '93* and *FIFA International Soccer*. The console's most praised titles were racing games: the first in the *Need for Speed* (1994) series and a port of *Road Rash* (1994). Despite some truly impressive titles, the 3DO company's liberal licensing policy ended up diminishing the overall quality of the software library.

Carl Therrien

See also: Generations of Technology

Further Reading

Electronic Gaming Monthly, Ziff Davis no. 51 (October 1993) and no. 53 (December 1993).

GamePro, IDG Communications, no. 49 (August 1993), no. 51 (October 1993), and no. 53 (December 1993). Available at https://archive.org/details/gamepromagazine?&sort=-downloads&page=2.

Herman, Leonard. "The Later Generation Home Video Game Systems." In *The Video Game Explosion: A History from PONG to PlayStation and Beyond*, edited by Mark J. P. Wolf, 161–172. Westport, CT: Greenwood Press, 2007.

Markoff, John. "For 3DO, a Make-or-Break Season." *New York Times*, December 11, 1994. Available at http://www.nytimes.com/1994/12/11/business/for-3do-a-make-or-break-season.html.

Shapiro, Eben. "Can a Testy Maker of Video Games Set a Standard?" *New York Times*, December 1, 1991. Available at http://www.nytimes.com/1991/12/01/business/can-a-testy-maker-of-video-games-set-a-standard.html.

3DO Today website. Accessed October 23, 2020. Available at http://

www.3dotoday.com.

“Which Game System Is the Best!?” *Next Generation* no. 12 (December 1995): 36–85. Available at https://archive.org/details/nextgen-issue-012.

Three-Dimensional Hardware. *See* 3-D Hardware

Time

Theories of time in video games can roughly be divided into two categories (Nitsche 2007, 145). Formalist time encompasses timers and timing mechanisms, the time it takes for game events to occur, and the passing of the player’s time. Experiential time takes into account the player’s perception of the passing of time based on the formal properties of time in the game.

The role of countdown timers has changed in scope as games have evolved, but their purpose is largely the same. Time limits add additional pressure to actions by threat of terminating play (Wolf 2001, 88). Some timers are visually displayed on-screen. The timer in the upper right-hand corner of *Super Mario Bros.* (1985) quickly counted down to zero to hurry the player through the stage. Players of Activision’s *Pitfall* (1982) had just 20 minutes to find the thirty-two treasures scattered around the jungle. Other timers tick away the seconds without visual display. Although it is never explicitly stated, each round of *Freeway* (1981) is limited to 136 seconds. Clocks can also measure performance—the “high score” is often the time it takes players to complete a level or race (Wolf 2001, 89).

Jesper Juul established a framework for the mapping of play time onto event time (Juul 2004, 131). Each game comprises a sequence of events that are supposed to have unfolded in some order as governed by an underlying logic (e.g., state changes, the simulation of processes, changes in the visual display, the passing of a narrative). These events do not need to be experienced in a set sequential order nor at the same rate. A *Quake* (1996) deathmatch unfolds with a direct mapping of play time to event time. In *SimCity* (1989), on the other hand, the passing of two minutes of play time might equal one year of event time in the simulation. Cutscenes in games suspend play time entirely in favor of event time. Pausing your party to select an attack strategy in *Knights of the Old Republic* (2003) pauses event time while continuing play time.

The relationship between play time and event time can also involve other changes in the game state, such as resetting, loading, and saving. Dying during a single-player campaign of *Halo: Reach* (2010) resets the game state to a previously saved checkpoint, in which event, time is rewound but play time continues. As a new area of Tokyo loads in *Persona 5* (2016), visual cues signal whether event time has been momentarily suspended or whether a larger passage of time has occurred. Game saves, according to Juul, are “manipulations of game time” that not only let a game be broken into multiple play sessions but also allow ways to roll back event time if players are unsatisfied with choices made during play time (Juul 2004, 138). Some genres, such as rogue-like games, eschew saving player progress in favor of a game experience in which the same event time is repeated.

These formal properties are useful for understanding the structure of time, but they do not describe how a player experiences time. This perspective "tries to describe a player's comprehension of temporal situations in games" (Nitsche 2007, 146). Continuing play after death, for example, can pose different interpretations based on how the game state is altered. If players restart from a checkpoint, they might resume with a snapshot of the game that was taken at the point progress was saved. They would have lost their progress and therefore be resuming with the same health, equipment, or statistics. Some games save this kind of statistical progress, treating the player's time as external to the event time of the game. For example, in *Bloodborne* (2015), players may return to the hub location to heal and upgrade their character, but defeated enemies will repopulate its world.

Some games persist even after the player has turned them off. Massively multiplayer online (MMO) games are set in worlds that continue on the server for other players. MMOs blend this continuous time with instanced events—dungeons that are created at the player's request and can exist simultaneously with other instances of the same space. Other games, such as *Animal Crossing: New Leaf* (2012), use the Nintendo 3DS system clock to judge how much time has passed since the game was last played and resume as if the game world had continued in real time while the system was off. In *Animal Crossing*, certain events occur only on specified days of the week, in-game holidays are marked on a real calendar, and events in the world have a day-and-night cycle. Additionally, if the player does not turn on the game for a few days, weeds will have sprouted around the town, and relationships with the other townsfolk may suffer from inattentiveness.

Michael Nitsche and Craig Lindley advocate for the essentiality of space in the understanding of time in video games. A player's movement through space maps to a temporal shift that involves play time, event time, and experiential time. The clock ticks away as a player moves forward through a level toward an objective, but it continues to tick if the player gets sidetracked and decides to explore an empty house along the side of the road. Because many games want to give players the freedom to proceed to a destination at different rates, many events in games are triggered only once a location is reached. Tasked with hurrying to the next location, players might spend twenty minutes getting somewhere that should only take five. Unless programmed to keep track of this time, the game state is indifferent to the play time—the woman giving you your next mission makes no mention of your tardiness.

Understanding the space of a game can have a temporal impact. According to its creator, balancing the popular *Counter-Strike* (1999) map "de_Dust" involved the careful timing of where the two sides would meet at the beginning of a round (Nitsche 2007, 147). A game world that does not allow players to teleport or fast travel across an expansive map may feel larger than one that does because all the space in between two locations must be experienced as play time. The same is true for games with distinct levels that take place in different locations. Although no play time has passed, J. C. Denton in *Deus Ex* (2000) is assumed to have experienced diegetic progress in game time when traveling from New York City to Hong Kong.

Time in video games results from the negotiation of the formal properties of passing time and changing game states as encoded into the game and the player's experience of the time spent playing.

Bobby Schweizer

See also: Navigation (Spatial); Navigation (Temporal)

Further Reading

Juul, Jesper. “Introduction to Game Time.” In *First Person: New Media as Story, Performance, and Game*, edited by Noah Wardrip-Fruin and Pat Harrigan, 131–142. Cambridge, MA: MIT Press, 2004.

Lindley, Craig A. “The Semiotics of Time Structure in Ludic Space as a Foundation for Analysis and Design.” *Game Studies* 5, no. 1 (October 2005). Available at http://www.gamestudies.org/0501/lindley/.

Nitsche, Michael. “Mapping Time in Video Games.” In *DIGRA ’07—Proceedings of Digital Games Research Association Conference: Situated Play*, 145–151. Tokyo: University of Tokyo, 2007.

Wolf, Mark J. P. “Time in the Video Game.” In *The Medium of the Video Game*, edited by Mark J. P. Wolf, 77–91. Austin: University of Texas Press, 2001.

Tool-Assisted Superplay (TAS)

On November 2003, moSMB3.wmv—an early viral video—circulated on the internet; it appeared to display superhuman performance in *Super Mario Bros. 3* (1988). The creator, Morimoto, not only finished the game in record-breaking time but also toyed with enemies and showed off seemingly impossible skills. However, the video was not the result of a human playing in real time but the outcome of meticulous planning and programming—a tool-assisted superplay (TAS). Morimoto’s detailed explanations were originally only available in Japanese; therefore, after discovering the circumstances, some English-speaking viewers felt cheated, but others were excited by the newfound possibilities. Among them was Joel “Bisqwit” Yliluoma, who founded Tasvideos.org, which is still functioning as the archive, forum, and database for the TAS community today (LeMieux 2014).

The basis for any TAS is a controller input file, which is created from a linear sequence of commands. Those files can be played back in emulators to recreate and optimize recorded runs. By using this technique, TAS creators can explore the limits of gameplay. Some seek to tweak certain aspects or to display perfection or almost godlike skill; others focus more on aesthetic and entertaining representation. Similar to classic speedruns, different categories or extra goals are available for the creation of TAS videos, for instance, in pacifist runs. Another similarity to speedruns lies in the importance of preparation and routing, especially the knowledge of game mechanics, useful glitches, and common tricks. In addition to these theoretical requirements, TAS creators can take advantage of a vast arsenal of tools. Using emulators enables pausing or speeding up games as well as editing inputs at frame-specific accuracy or rewinding actions via savestates. Additionally, reading out data from RAM and accessing random number generators open more possibilities, such as manipulating drop rates and other hidden variables. Some creators even utilize code mining to inspect the underlying algorithms or the usage of scripting language for the automation of certain in-game tasks.

James Newman describes *superplay* as more than "beating" the game but as practices "bound together by a common desire to demonstrate mastery of the game through performance" (2008, 123). This notion can be retraced in modern TAS videos that deviate from the pursuit of pure speed and perfection to create innovative and creative forms of superplay. For example, Julian "Masterjun" N. demonstrated in 2012 that some glitches allow creators to execute arbitrary code through manipulation of the instruction pointer. This method was used to force games to skip directly to the ending or to alter the game mechanics in various fundamental ways.

Another example is TASBot, which consists of a Nintendo R.O.B. holding a circuit board and is able to play TAS files on original console-based hardware. It was created in December 2013 by Allan "dwangoAC" Cecil and became popular after debuting its console-verification skills on Awesome Games Done Quick 2014. Cecil emphasizes that this endeavor has entertaining as well as educational elements, especially considering its similarities to hacking. In 2016, TASBot and game-breaking glitches came together in presenting *Pokémon Plays Twitch*. In this demonstration, arbitrary code execution was used to take over an original *Pokémon* (1996) cartridge inside a Super Game Boy inside a Super Nintendo Entertainment System (SNES). Afterward, raw IRC data was cleaned, translated, and sent through the controller cords to be displayed live on the stage and via Twitch (Orland 2015), proving that years after the original moSMB3.wmv, tool-assisted human-machine interaction can still surprise and excite people.

Tim Glaser

See also: Speedruns

Further Reading

Cecil, Allan, Ilari Liusvaara, and Jordan Potter. "Pokémon Plays Twitch." *PoC||GTFO* 0x10 (January 2016): 7–23.

Franklin, Seb. "We Need Radical Gameplay, Not Just Radical Graphics: Towards a Contemporary Minor Practice in Computer Gaming." *Symploke* 17, nos. 1–2 (2009): 163–180.

LeMieux, Patrick. "From NES-4021 to moSMB3.wmv: Speedrunning the Serial Interface." *Eludamos: Journal for Computer Game Culture* 8, no. 1 (2014): 7–31

Newman, James. *Playing with Videogames*. New York and London: Routledge, 2008.

Orland, Kyle. "How an Emulator-Fueled Robot Reprogrammed *Super Mario World* on the Fly." Ars Technica, January 14, 2014. Available at http://arstechnica.com/gaming/2014/01/how-an-emulator-fueled-robot-reprogrammed-super-mario-world-on-the-fly/.

Orland, Kyle. "*Pokémon* plays Twitch: How a Robot Got IRC Running on an Unmodified SNES." Ars Technica, January 5, 2015. Available at http://

arstechnica.com/gaming/2015/01/pokemon-plays-twitch-how-a-robot-got-irc-running-on-an-unmodified-snes/.

Scully-Blaker, Rainforest. "A Practiced Practice: Speedrunning through Space with de Certeau and Virilio." *Game Studies* 14, no. 1 (August 2014). Available at http://gamestudies.org/1401/articles/scullyblaker.

Touchscreen Games

Touchscreen games use computer interfaces that afford direct interaction with the screen, whether by touch of the hand or finger or through the use of an object, such as stylus. Contact with the screen generally signals—and signifies—a "touch," resulting in a diegetic action or core mechanic within a game. While touchscreen games have existed throughout much of video game history, they have proliferated in the last decade and, to some degree, coalesced under the term *casual games*, thanks to the introduction of smartphones and tablets built around touchscreens. Touch controls are often considered intuitive and easy to use and are often referred to as *gestural*, *mimetic*, or *natural* user interfaces for their appropriation of preconditioned everyday hand gestures for interaction (such as tapping, dragging, swiping, pinching, and tracing). Video games, however, present a diverse array of touchscreen methods and gameplay mechanics.

TOUCH AND TECHNOLOGY: A BRIEF HISTORY

Touch has long served conceptually as a holy grail of presence or intimacy for various interactive and tele-technologies ("Reach out and touch someone," as AT&T urged telephone users to do metaphorically). Modern touchscreens augment the rather "flat" experience of touching glass displays with other haptic feedback cues (such as visuals, sounds, vibrations, and force feedback) to imbue touch with synesthetic enhancements. However, historians note that touchscreen development diverged from other haptic technologies and has its own path of development (see Parisi 2018). This history begins with antecedents to the modern-day touchscreen stylus—notably, developments in pen computing in the 1950s, including a light pen for MIT's influential Whirlwind computer and the relatively unknown Styalator tablet (1957). Ivan Sutherland's *Sketchpad* (1963) and Alan Kay's Dynabook concept for personal computing (1968) would later popularize the idea of direct screen contact via pen or stylus among computer engineers, techno-futurists, and science fiction enthusiasts (e.g., Lieutenant Uhura's stylus-enabled electronic clipboard on *Star Trek* [1966–68]).

Black OUT
Throw to win
500 TICKETS
THROW TO COVER THE SUN
FRUIT NINJA FX 2
FRUIT NINJA FX
CREDITS 0/4
FORTUNE

Some touchscreen games in the arcade of LaserTag Adventure in Waukesha, Wisconsin. (Courtesy of Mark J. P. Wolf)

Later breakthroughs demonstrated that touchscreens could also respond to the human hand. Eric A. Johnson, an engineer at the Royal Radar Establishment in Malvern, England, invented a desktop screen in 1965 that could sense single-finger touch using a capacitive conductor. Capacitive touchscreens have a thin coating of conductive material that responds to a disturbance in its electromagnetic field—such as the conductivity of a finger touch. Although capacitive touchscreens would eventually become the dominant touch technology, the first broadly available touchscreens used resistive, or pressure-sensitive, detection. Cheaper and more durable than capacitive touch, resistive touchscreens initially made their way into some commercial (such as ATMs) and industrial applications. These touchscreens were limited to a single point of contact, but multitouch displays were already emerging in the lab: engineer Nimish Mehta's multitouch Flexible Machine Interface at the University of Toronto in 1982 was followed in rapid succession by a multitouch screen at Bell Labs in 1984 and the first multiscreen tablet in 1985, again at the University of Toronto. Such lab-based advances in the 1980s and 1990s would not become widely commercialized until the emergence of smartphones and tablets in the early 2000s.

EARLY TOUCHSCREENS AND THEIR GAMES

A number of early media technologies invited playful touching of screens and displays, even if the feedback was very limited or even imaginary. Early encounters by users with touch-responsive personal computers included the PLATO IV (1972), a computer-assisted instruction system introduced at the University of Illinois, and the Hewlett-Packard HP-150 (1983), which is considered the first commercially released touchscreen PC. Both PCs relied on infrared sensors mounted in the display frame to detect contact. However, most of the elements constituting contemporary touchscreen gaming began to fall into place starting in the 1990s. The Apple Newton MessagePad (1993) was the first touchscreen-based personal digital assistant (or PDA, as coined by Apple), which offered games such as *Backgammon*, *Checkers*, and *Risk* (1957) as well as some simple action games, including a variant of the early computer classic "snake" game (in which an obstructing "tail" grows behind the player). Newton also supported a dedicated porting community, and a number of Infocom text-adventure games, such as *Zork I* (1980), became available on Newton, with players using the stylus to tap the screen or handwrite actions. Though much maligned, the Newton established the form factor and interface that would inform the next evolution in PDAs: the PalmPilot.

The PalmPilot's grayscale screen and stylus operation supported some surprisingly detailed and involving video games, including board games, card games, pinball simulators, side-scrolling platformers such as *Shadow Thief* (1998), and a slew of role-playing games (RPGs) likely informed by the popularity of *The Legend of Zelda: Link's Awakening* (1993) on Nintendo's Game Boy handheld system. In 1999, Gamasutra called PalmPilot a "Game Boy for grown-ups," as the prevalence of RPGs on PalmPilots, such as *Dragon Bane* (1998), *Kyle's Quest* (1998), and *Ackeron: Dark Sun* (2000), attest. But the most distributed PalmPilot game was the device-bundled title *Giraffe* (1997), a *Space Invaders*–style game that taught users Palm's particular graphical "language" (called Graffiti) for accurate handwriting recognition.

TOUCHSCREENS AND DEDICATED GAMING DEVICES

The 1990s also introduced the first touchscreen for a game-centric handheld device: Tiger Electronics' Game.com (1997) and Game.com Pocket Pro (1999). Both devices were effectively dead on arrival due to their outdated form factors and slow display refresh rates (known as *ghosting*). Despite this false start, handheld touchscreen gaming would flourish under Nintendo's direction. Facing stiff competition from consoles and other devices in the early 2000s, Nintendo rolled out the DS (Dual Screen) handheld in 2004, a clamshell that included a stylus and resistive touch on the lower of its two full-color screens. Introduced under the advertising banner "Touching is good," the DS supported a slew of stylus-based touchscreen games, including caring for a pet in *Nintendogs* (2005); helping with meal preparation in *Cooking Mama* (2006); solving puzzles in the best-selling *Brain Age: Train Your Brain in Minutes a Day!* (2006); wielding the stylus like a scalpel in *Trauma Center: Under the Knife* (2005); navigating avatars through adventures or challenging environments in *The Legend of Zelda: Phantom Hourglass* (2007) and *Kirby's Canvas Curse* (2005); and aiming and shooting in action games such as *Metroid Prime Hunters* (2006). Nintendo even released a pair of drumstick-like styluses for the drumming rhythm game *Taiko no Tatsujin*

(2007). Touchscreens were so successful for Nintendo that the DS would become the second-best-selling game device of all time (just behind Sony PlayStation 2). Nintendo continued to tweak the DS line, but its most notable change came with the addition of an autostereographic 3-D screen on the 3DS (2011). However, touch capability remained relatively consistent, even as the limits of resistive stylus-oriented touchscreen use were tested in games such as *Kid Icarus: Uprising* (2012), a third-person shooter released for the 3DS.

The only major competitor to the DS line was the Sony PlayStation Portable (PSP, 2004) and its successor, the Vita (2012). Sony did not introduce a touchscreen until the Vita, which has a touchscreen on the front and touchpad on the back. The platformer game *Tearaway* (2103) makes notable use of the double-sided touch capability, as players touching the back can create the impression of their fingers intruding into the game world from below. *Touch My Katamari* (2012), a Vita-only installment in the popular series, also uses the back touch panel to stretch or shrink the Katamari ball, while fingers on the touchscreen navigate. Such novel applications aside, the market for dedicated gaming handhelds has been eroded by smartphones and tablets, and Sony ended Vita production in 2019.

Nintendo's response to dwindling market share blurs the divide between handheld and console gaming, unveiling in recent years touchscreen devices that operate as both. The Wii U (2012) features a resistive touchscreen "digitizer" and stylus built into its GamePad, which serves as a touchable handheld display in both off-TV and connected use. Various *Mario* and *Zelda* games reigned as the best-selling titles for Wii U, and the device may be best known for its successful touch-enabled remakes of *The Legend of Zelda* classics *The Wind Waker HD* (2013) and *Twilight Princess HD* (2016). In both games, map wayfinding and handling inventory management are touch enabled to streamline nonessential gameplay. Perhaps the most innovative implementation of the Wii U's touchscreen is *Super Mario Maker* (2015), which allows players to make their own game levels by touching and arranging beams, blocks, and other game objects.

The Nintendo Switch (2017) platform continues in the same vein but offers detachable Joy-Con controllers on the sides of the screen for more flexibility. The Switch also marks Nintendo's first foray into capacitive, multitouch screen technology that jettisons the stylus and brings the device's touch capabilities more in line with those found on smartphones and tablets. A notable touch game for the Switch is *Sushi Striker: The Way of Sushidos* (2018), a challenging action puzzler that requires players to tap and drag plates of sushi to collect them and then throw them at an opponent. Many players report the game's hectic action is better suited to the Switch's touchscreen than its Joy-Con controllers. Thus far, however, relatively few new Switch games rely on its touchscreen, and most of those are updates of Wii U games (such as the platformer *Rayman Legends Definitive Edition* [2017]) or ports from the most successful touchscreen devices of the past decade: smartphones and tablets.

SMARTPHONE AND TABLET TOUCHSCREEN GAMING

Although Apple did not invent multitouch, the iPhone, in 2007, and iPad, in

2010, successfully inaugurated a sustainable market for smartphone and tablet touchscreens (and, later, touchscreen watches) that is now dominated by Apple and Google and their respective download stores for apps and games. Perhaps the first contemporary smartphone game is *Lights Out* (2007), a puzzle game that has players touching the screen to turn off patterns of lights. *Lights Out* is a remake of the 1995 *Lights Out* handheld game that featured illuminating buttons, which in turn is a remake of a game found on *Merlin* (1978), an early handheld device that used a touchable LED display membrane (and was the best-selling handheld game of 1980). Another early and popular touchscreen title is *Paper Toss* (2009), which introduced many players to the playful potential of swiping or flicking a finger across the surface of the screen to throw an object. But the *Citizen Kane* of touchscreen gaming is arguably Rovio Entertainment's *Angry Birds* (2009 for iOS; 2010 for Android). *Angry Birds* offers a simple touch-and-drag mechanic to aim and stretch a slingshot to launch birds at a variety of building block structures housing sarcastically chortling pigs. *Angry Birds* successfully distills casual gaming's serial interruptible format and paves the way for the "everyday ubiquity" (see Steirer and Barnes 2019) of touchscreen gaming in every aspect of daily life. This includes using the connectivity and telepresence of smartphones to create playful interactions with faraway opponents, as seen in *Words with Friends* (2009), an adaptation of Scrabble (1938), and *Draw Something* (2012), inspired by Pictionary (1985).

Although touchscreen interfaces have become synonymous with casual gaming, today, we find every genre and type of play experience on touchscreens. One unique form not found on PCs or consoles is location-driven augmented reality (AR) gaming, which uses GPS tracking and embedded cameras in mobile devices to blend physical and virtual spaces into touchable play. The company Niantic pioneered the genre with *Ingress* (2012) and built on that game's collected location data (such as landmarks, statues, and parks) to develop *Pokémon Go* (2016). The hit game compelled players to leave the house to catch Pokémon in the "wild," visit PokéStops for collectible items, and control Pokémon Gyms with networked teams of other players.

While AR touchscreen games incorporate physical spaces and material objects, game artists are restoring the physicality of other humans. The dancing game *Bounden* (2014) presents a mix of Twister (1966) and ballet; two players mutually hold a touchscreen while their bodies move and touch as guided by on-screen markers. Similarly, UCLA Game Lab artist Nick Crockett's *Super Tap-Out Saga* (2014) is a boxing game that encourages two players to physically push, pull, and block each other while attempting to tap on their opponent's on-screen avatar.

The success of touchscreen gaming has also been buoyed by—and highly criticized for—capitalizing on a free-to-play (F2P), or "freemium," economic model that uses financial microtransactions during gameplay for upgrades, features, and boosts. The match-three puzzle game *Candy Crush Saga* (2012), considered the most financially successful touchscreen game to date, uses in-game payments to buy extra lives, moves, or levels and includes a social economics dimension as well, as players can share lives with friends through Facebook. Peak Games, the developer of the minigame titles *Toy Blast* (2015) and *Toon Blast* (2017), pairs the freemium model with aggressive advertising to cut through the clutter of free downloadable games. For example, actor Ryan Reynolds appears in humorous ads about playing *Toon Blast* as a tie-in to *Deadpool 2*, and game company Supercell relies on extensive television ad buys (including a spot in Super Bowl XLIX) to drive downloads of its popular series of strategy games, including *Clash of Clans* (2012), *Boom Beach* (2014), and *Clash Royale* (2016).

ARCADE GAME TOUCHSCREENS

Arcade games have long used haptic feedback to enhance immersion, but touching screens—either directly or with an intermediary object—has been relatively limited, as most arcade cabinets prize smudge-free displays and the precision interaction afforded by hardware controllers. One notable exception is gambling machines, such as touchscreen slots and various card games of chance, which can be found in many casinos and bars in seemingly endless iterations. One high-fidelity entry in this category is *Big Tony's PokerKard* (2008), a Texas Hold'em poker game that uses a touchscreen on an arcade-like cocktail cabinet to emulate a poker table.

Arcades in Japan and South Korea have expanded notions of touchable play surfaces and screens. One interesting genre is digital collectible card games, in which players arrange card decks on a touchable, position-sensitive surface, with the results displayed above on a conventional screen; *World Club Champion Football* (2002) and the wargame *Sangokushi Taisen* (2005) are popular examples. Perhaps unsurprisingly, rhythm-and-dance games are popular touchscreen titles, and SEGA's "performi" line of games features the standout title C*hunithm* (2014). Combining a glowing touchscreen-like piano keyboard with motion controls, the game requires players to hammer on the keys as well as lift their hands in sync with a flowing timeline, resulting in a hyperstylized pantomime of a concert pianist. While *Chunithm* is a Japan-only title, Pentavision Entertainment's *DJMax Technika* (2008), developed and released in South Korea, has gone international, and the music-mixing game has players rapidly tapping notes on a multitouch screen to prevent a break in a song's playback.

Outside of Asia, more conventional arcades present upscaled adaptations of touchable smartphone and tablet games. Slashing flying watermelons in the arcade version of *Fruit Ninja FX 2* (2010) involves more of the arm and shoulder, while *Bejeweled* (2011) for the arcade can accommodate up to four players and be outfitted with a ticket redemption feature. A more innovative use of touchscreen mechanics is found in *Black Out* (2012), which uses a *Paper Toss*–like flick to launch impish characters called Googabongas at a giant sun to blot it out with their splatting bodies. As *Black Out*'s retro cabinet and prize-dispensing compartment suggest, arcades and amusement parks are taking cues from historical midway and carnival games to create modern hybrids of touchscreens and physical props. *Ice Man* (2017) evokes water cannon–styled games, allowing two players to shoot virtual zombies with actual water and freeze them on-screen as real mist rises from the bottom of the cabinet to enhance the atmosphere. A similarly engineered machine, *Go Ball-Istic* (2010), reworks the classic ball toss game, allowing players to hit various targets on a screen by throwing soft playballs at it.

FUTURE OF TOUCH: BEYOND THE SCREEN

As arcade adaptations suggest, touchscreens have saturated our culture and crossed over into almost every space and setting. Touchscreen use is now showing signs of maturation and retrenchment after early excesses (such as touchscreen-dominant automobile dashboard displays) and failed experiments. Apple, for example, has abandoned its "3D Touch" feature, introduced on the iPhone 6 line in 2015, which included pressure-sensitive touch for another layer of gesture and interface. However, for designers, artists, and technologists, touching screens and projections remains an opportunity for invention. For example, at Two Bit Circus, a "micro amusement park" in Los Angeles (its CEO is Brent Bushnell, son of Atari cofounder Nolan Bushnell), players in carnival-like booths destroy screen-projected buildings by swinging a small-scale wrecking ball or throw colorful balls at virtual balloons to pop them. The future of touch is also moving beyond the boundary of the wall or screen to complement the more immersive environments promised by augmented, virtual, and mixed reality. If touchscreens today place video games firmly, if flatly, within our hands, immersive environments that allow us to reach out and touch something—or someone—hover just at the edge of our grasp.

David O'Grady

See also: Graphics; Peripherals

Further Reading

Anable, Aubrey. "Touching Games." In *Playing with Feelings: Video Games and Affect*, 37–69. Minneapolis: University of Minnesota Press, 2018.

Buxton, Bill. "Multi-Touch Systems that I Have Known and Loved." BillBuxton.com, July 21, 2016. Available at http://www.billbuxton.com/multitouchOverview.html.

Ion, Florence. "From Touch Displays to the Surface: A Brief History of Touchscreen Technology." Ars Technica, April 4, 2013. Available at https://arstechnica.com/gadgets/2013/04/from-touch-displays-to-the-surface-a-brief-history-of-touchscreen-technology/.

Keogh, Brendan. "Touching the Looking Glass." In *A Play of Bodies: How We Perceive Videogames*, 51–74. Cambridge, MA: MIT Press, 2018.

Parisi, David. *Archaeologies of Touch: Interfacing with Haptics from Electricity to Computing*. Minneapolis: University of Minnesota Press, 2018.

Sobchack, Vivian. "What My Fingers Knew: The Cinesthetic Subject, or Vision in the Flesh." In *Carnal Thoughts: Embodiment and Moving Image Culture*, 53–84. Berkeley: University of California Press, 2004.

Steirer, Gregory, and Jeremy Barnes. "Angry Birds: Mobile Gaming." In *How to Play Video Games*, edited by Matthew Thomas Payne and Nina Huntemann, 216–223. New York: NYU Press, 2019.

Transmedia. *See* Adaptation; Comics; Film; Industry; Merchandising; Silent Film; Social Media; Subcreation; Television; Video Game Movies; Video Game Novels; Video Games and Literature; Visual Novels; World (of a Video Game)

Treasure Co. Ltd.

Treasure Co. Ltd. is a small Japanese video game developer primarily known for its innovative action titles and unusually high-quality licensed games. Treasure's games (excepting licensed titles) typically feature a high degree of difficulty, large-scale boss fights, technical aptitude (particularly *Sin & Punishment* [2000] for the Nintendo 64), and an odd sense of humor. These features have garnered the company a dedicated following.

The company was founded on June 19, 1992, by Masato Maegawa, a former programmer at Konami. Although reasons for Maegawa's departure are unclear, it is commonly believed to have been motivated by a desire for greater creative freedom. This led to a pervasive, although now provably false, rumor that Treasure had an internal policy forbidding the development of sequels.

Creativity is a key theme in Treasure's games and in its development practices. Most of its major successes involve innovations in established genres. Its first and possibly best-known title, *Gunstar Heroes* (1993) for the SEGA Genesis, takes the classic run-and-gun platform genre and adds several twists to the formula along with a sense of ironic humor. *Mischief Makers* (1997), for the Nintendo 64, is a platform game in which the core mechanic involves grabbing objects, characters, and enemies to shake them. The more recent arcade hit *Ikaruga* (2001) blends the classic scrolling shooter genre established by *Space Invaders* (1978) and *Galaxian* (1979) with a color-matching puzzle game.

In terms of its development process, Treasure's games are developed by small teams, usually ranging from three to ten members. Team members are given a high degree of creative freedom. In a 2010 interview with Nintendo president Satoru Iwata, Maegawa (who at the time of the interview was president of Treasure) said, "Even today it's normal for three people to be a team at our company. That way they can do what they want and really make it stand out." Throughout the interview, Maegawa emphasized that Treasure employees are given creative freedom, leading to the unique nature of their games. In earlier interviews with gaming and media news website IGN (2005) and gaming news website 1up.com (2007), Maegawa further emphasized that the teams decide what they want to design and the platform they are designing for. From the 1up interview, he said, "Treasure supported N64 (Nintendo 64) because the team wanted to work on the system. I always listen to the team and they basically chose the N64 because they thought it would be easiest for them to create games on. That was the same reason we decided to work on the Xbox 360." Although Treasure's first seven games all appeared on SEGA hardware, the company has since diversified, creating titles for a wide range of platforms from SEGA, Nintendo, Sony, and Microsoft.

As of 2018, Treasure is still active, having released *Gaist Crusher God* in 2014 for the Nintendo DS. In addition to full retail titles, the company has taken to digital distribution to rerelease its older titles via the Nintendo Wii Virtual Console and the Microsoft Xbox 360 Live Arcade.

Jason Scott Begy

See also: Japan

Further Reading

Gantayat, Anoop. *Talking with Treasure*. IGN, 2005. Available at https://www.ign.com/articles/2005/09/13/talking-with-treasure.

Kennedy, Sam. "Treasure Talks 360, Wii, and PS3." 1up.com, 2007. Available at https://n4g.com/news/19066/treasure-talks-360-wii-and-ps3?info = true.

Satoru Iwata. "Iwata Asks: Sin and Punishment: Star Successor." Wii.com, 2010. Available at https://web.archive.org/web/20100725053609/http://us.wii.com/iwata_asks/sinandpunishment/vol1_page1.jsp.

TurboGrafx-16. *See* NEC PC-Engine/Turbografx-16

Turkey

The Turkish game design and development scene is young and small compared to Western industry, but it is a rapidly growing market. Cetin Tuker, Erdal Yilmaz, and Kursat Cagiltay (2015) discuss Turkish game development history in three levels. The first level is the "Beginner Level," and it covers the 1980s. Personal computers were too expensive for Turkish people, so most of them could not afford to own a device to develop any game software. Some programmers developed simple tic-tac-toe-like games on mainframe computers at universities. Starting from mid-1980s, more affordable systems became available from Commodore, Sinclair, and Amstrad, and by the end of the 1980s, Amiga 500 systems became popular. A society of young gamers gathered around these popular systems, using computer magazines and a few programming books that published simple game code examples. At the end of this era, the first attempts at video game development, by a few indie groups, started to emerge. However, none succeeded in selling more than a thousand copies. The best-known Turkish game maker of this era is likely Mevlüt Dinç, a young game developer living in the United Kingdom, who developed world-famous titles for prominent game producers of the time. Some of these were Firebird Software's *Gerry the Germ Goes Body Poppin'* (1985), System 3 Software's *Last Ninja 2: Back with a Vengeance* (1988), and Activision's *Hammerfist* (1990).

The next level, the "Amateur Level," covers the 1990s (Tuker et al. 2015, 566). With the help of the Amiga 500, which had better multimedia capabilities, a few indie groups managed to publish the first examples of boxed games. The first title was Digital Dreams' *The Dagger* (1992), a game inspired by the history of the Ottoman Empire. This was the first Turkish hit, selling twenty-two hundred copies in two years. During this era, some other outstanding titles also managed to pass the one thousand–copy threshold, including Siliconworx's *Fields of Hope* (1993), which sold one thousand copies, and *Legends of İstanbul: Tulip Warriors* (1994), which sold two thousand copies. During the second half of the 1990s, as PCs became more affordable and penetrated into market, more titles were published by more financially powerful companies, such as Cartoon Studios' *Detective Storm* (1996) and a 1996 PC remake of *Legends of İstanbul*, which, bundled with computer magazines, had forty-five thousand copies distributed. The game that probably received the largest investment during this era was SEBİT Education and Information Technologies' *Piri the Explorer Ship* (1997).

Video games on display in a game store in Eskisehir, Turkey, on August 11, 2017. (Ipek Morel Diplikaya/Dreamstime.com)

The last level, the "Professional Level," covers the first decade of the 2000s (Tuker et al. 2015, 566). At the beginning of 2000s, Mevlüt Dinç moved from the United Kingdom to Turkey and launched Dinç Interactive (later Sobee Studios), which released many titles, including *Football Manager* (2003); *Magic Billiards with Semih Saygıner* (2004); *Istanbul Apocalypse Time* (2006), which was Turkey's first massively multiplayer online role-playing game (MMORPG); *Nightmare 22* (2006); *I Can Football* (2009); and *Supercan* (2011). These titles reached five hundred thousand to two million users. During this period, other young developers also started to publish their own titles. These include *The Ambush: Awakening* (2005, by 3TE Games), *Culpa Innata* (2007, by Momentum DTM), *Sovereign Symphony* (2007, by Ceidot Studios), and *Monochroma* (2014, by Nowhere Studios). Probably the most important series of this era was Taleworlds' *Mount and Blade* series, which began in 2008 and as of 2019 was still an active and successful franchise in the world game market.

As smartphones started to take over the game market in Turkey, most young and small development groups started to develop games for them, as such games required less investment of time and money. Successful examples include Duello Games' *iSlash* (2010), Mild Mania's *Rop* (2015, iOS version), and Yunus Ayyıldız's *Hocus* (2015, iOS version). Some of these small groups and personal entrepreneurs eventually became start-ups, while other, larger game producers also produced globally popular titles in the mobile gaming scene, such as Gram Games' *1010!* (2017) and Peak Games' *Toy Blast* (2015).

Another title from this era worth mentioning because of its artistic interpretation is *Recontact Istanbul* (2015), by Eray Dinç and Simay Dinç, along with its sequel, *Recontact Istanbul 2: Eyes of Sky* (2017). Video artist Eray Dinç brought a brand-new interpretation of mobile gaming, defining a new art form, by creating a cinematographic detective simulation that criticizes the normalization of the phenomenon of "being watched" with the help of security cameras. *Recontact Istanbul* won the Best App Award at the Los Angeles New Media Film Festival in 2017.

VIDEO GAME DESIGN AND DEVELOPMENT EDUCATION

Small, private institutions offer short-term courses that teach necessary development skills in several programming languages that are popular in the gaming industry and courses to improve software-using skills in the areas of game engines, modeling and animation, and the creation of game assets. Unfortunately, these institutions are presently only in big cities, where game development companies are established.

More promising progress can be found in universities. As of 2019, four universities, Bilgi University, Beykoz University, and Bahçeşehir University (BAU) in İstanbul and Eastern Mediterranean University in Northern Cyprus, offer bachelor's degrees in video game design. BAU also offers a video game design master's degree. Additionally, İstanbul Technical University's Game and Interaction Technologies Program, Middle East Technical University's Game Technologies Program, Hacettepe University's Computer Animation and Game Technologies Program, and İzmir Economy University's Video Game Technologies Program are the graduate-level programs offered by those universities. Among these, BAU puts an emphasis on the production and business development phases of the game design process, whereas others put an emphasis on the engineering and development process. The same universities have incubation centers for game start-ups and technopolis organizations that house some of Turkey's largest game production companies, an indicator that the Turkish game scene is now advancing to a more institutional level (which we could call the "Institutional Development Level"), that will hopefully, in the future, create a more rooted game development industry.

VR/AR LABORATORIES ESTABLISHED IN UNIVERSITIES

In January 2016, two universities announced the establishment of virtual reality/augmented reality (VR/AR) research centers. The Giresun University Augmented

Reality Research Center, for scientific research and development, is funded by university resources (Artırılmış Gerçeklik 2016). The other center is VR First BAU, in İstanbul (VR First 2016). BAU and Crytek joined forces to start Turkey's first VR laboratory at the Galata campus of the university, under the VR First Program, which is a global VR educational initiative to get students familiar with VR technologies. VR First BAU was also the first VR laboratory of the program (Sinclair 2016). In September 2016, VR First opened the second VR/AR laboratory in Turkey at the Middle East Technical University in Ankara, where the first game development incubation center, ATOM (Animation Technologies and Game Development Center), was also established in 2008 (ODTU Teknokent 2016). After only one year, in the beginning of 2017, VR First and Crytek split (Sinclair 2017), and VR First became independent, with the help of other partners, to achieve its goal: democratization of VR/AR innovation. Hacettepe University is the third university in Turkey to join the VR First network.

As of February 2019, VR First has a network of fifty-two VR/AR laboratories that connect several academic institutions all around the world (VR First 2019). The last VR/AR laboratory is the KARMA Lab of Koç University, which was established with the support of the İstanbul Development Agency. The aim of the laboratory is to support the development of new generation interfaces, including IOT systems, biosensors, and VR/AR technologies (Karma 2019).

ASSOCIATIONS

As of 2019, there are two game developer associations established in Turkey: the Game Developers Association of Turkey (TOGED), located in Ankara, and the Game Designers, Developers, and Publishers Association (OYUNDER), located in İstanbul. Although both associations have almost similar missions, such as the development of the domestic game ecosystem, the creation of a network for game professionals, and increased public awareness, according to members' profiles, TOGED is more business oriented, and OYUNDER is more focused on the individuals and employees (designers, developers, artists, lawyers, academicians, etc.) working in the sector, although some members are game development companies.

PRACTICES OF THE VIDEO GAME MARKET, MANAGEMENT, AND ECONOMY

There are roughly twenty-nine million gamers in Turkey, according to a 2016 report (Turkish Game Market 2016 Report – Gaming In Turkey 2016). Mobile gaming is very common, with more than twenty-two million gamers using mobile devices to play games. According to a 2017 survey conducted by OYUNDER among the members of the association, video game developers in Turkey are predominantly young (the average age is twenty-six) and male (92%), and they mostly work in small teams; 86.6 percent of game development teams have fewer than ten people. Most of these developers reported that they have never conducted any marketing research (şengün 2018). şengün (2018) points out that Turkish game developers still have "indie characteristics of small groups, low funding, and under-emphasis on traditional marketing channels" (356).

As TOGED president Ali Erkin reports in one his interviews, in 2018, total video game exports of the member companies of TOGED were $1.05 billion, an increase of more than 20 percent every year over the last four years ($400 million in 2015; $500 million in 2016; and $700 million in 2017). Most of this income is from the export of mobile games, PC games, and serious games (including simulation systems), respectively. He adds that this number is slightly higher if exports of companies that are not TOGED members are also counted. Turkey's video game industry is bright, with video game exports for 2023 projected to be more than $2.5 billion dollars (Merlin'in Kazanı 2019).

Çetin Tüker and Kursat Cagiltay

Further Reading

Artırılmış Gerçeklik. 2016. Available at http://artirilmis.giresun.edu.tr/index.php?id = 292.

Karma. 2019. Available at https://karma.ku.edu.tr/tr/.

Merlin'in Kazanı. *Türkiye oyun ihracatında 1 milyar doları geçti*. YouTube, January 19, 2019. Available at https://www.youtube.com/watch?v = 4BW8WIlQ_Yg.

ODTU Teknokent. *ODTÜ Teknokent ve Crytek ışbirliği*. 2016. Available at http://odtuteknokent.com.tr/tr/haber/odtu-teknokent-ve-crytek-is-birligi.

şengün, S. "A Survey of Marketing Management for the Video Games Industry in Turkey." In *Marketing Management in Turkey (Marketing in Emerging Markets)*, edited by Selcen Ozturkcan and Elif Yolbulan Okan, 353–387. Bingley, UK: Emerald Group Publishing Limited, 2018.

Sinclair, B. "Microsoft, Crytek Launch Educational Gaming Initiatives." GamesIndustry.biz, January 19, 2016. Available at https://www.gamesindustry.biz/articles/2016-01-19-microsoft-crytek-launch-educational-gaming-initiatives.

Sinclair, B. "VR First and Crytek Split." GamesIndustry.biz, April 13, 2017. Available at https://www.gamesindustry.biz/articles/2017-04-13-vr-first-and-crytek-split.

Tuker, Cetin, Erdal Yilmaz, and Kursat Cagiltay. "Turkey." In *Video Games around the World*, edited by Mark J. P. Wolf, 565–578. Cambridge, MA: MIT Press, 2015.

"Turkish Game Market 2016 Report – Gaming In Turkey." 2016. Available at https://www.gaminginturkey.com/en/turkish-game-market-2016/.

VR First. 2019. Available at https://www.vrfirst.com/#programs.

VR First BAU. "Local Virtual Reality Brands Are Coming." 2016. Available at https://bau.edu.tr/news/11705-local-virtual-reality-brands-are-coming.

TV. *See* Television

2600. *See* Atari VCS 2600

Twin Galaxies

Twin Galaxies is the officially recognized worldwide authority on all video game scores and world records. The organization tracks player rankings and gaming statistics and regulates gaming contests and championship tournaments, with information dating from the 1930s and video game statistics from the early 1970s. As the electronic gaming industry's premier statistician, Twin Galaxies preserves the history of gaming in its database, which documents the historical milestones of the electronic gaming hobby as it evolves into a professional sport.

Founded in 1981, Twin Galaxies grew from modest origins as a video arcade to gain recognition as the official scorekeeper for the world of video game & pinball playing, vested with the authority to verify "official" world record high scores and crown new world champions. The Twin Galaxies Scoreboard was the creation of Walter Day, Twin Galaxies' founder, who, on June 6, 1981, embarked on a series of business trips that took him through fifteen U.S. states in four months. Although his role as a traveling salesman was the focus of his trip, Day's real passion was to visit as many video game arcades as possible and record the high scores he found on each game. Ten thousand miles and one hundred arcades later, on November 10, 1981, Day opened his own arcade in the sleepy Midwestern town of Ottumwa, Iowa. He named his arcade Twin Galaxies, a name that simply sprang out of his head one day. The name rolled off the tongue so easily and felt so familiar to Day that he actually thought he must have heard it being used somewhere as another company's name. Not so—it was simply an inspirational thought, and the name has stood ever since.

On February 9, 1982, Twin Galaxies' tranquil existence was altered when Day's growing database of high score statistics was made available to the public as the Twin Galaxies National Scoreboard. In the coming years, the Twin Galaxies arcade, and the town of Ottumwa in general, was considered to be the number one hot spot for competitive video gaming, as many significant tournaments and world record gaming attempts were performed there. As the organizational center of competitive video game playing, Twin Galaxies received immediate recognition from the major game manufacturers of the day—Atari, Midway, Williams Electronics, Universal, Stern, Nintendo, and Exidy—in addition to support from *RePlay* magazine and *Play Meter* magazine, the two premier coin-op publications of that era.

Twin Galaxies' role as the scorekeeper grew in importance as "player rankings" became a major focus of the media. As the pioneer in ranking the top players, Twin Galaxies was called on to bring the superstar players together for many well-publicized contests and media events. For example, on November 7, 1982, *LIFE* magazine visited Twin Galaxies to capture sixteen of North America's best players in a group photograph. On November 30, 1982, the mayor of Ottumwa, Jerry Parker, declared the hometown of Twin Galaxies to be the Video Game Capital of the World. That month, Ottumwa hosted the first North American Video Olympics, and two months later, on January 9, 1983, ABC-TV's *That's Incredible* came to Ottumwa, Iowa, to film nineteen of the world's best players competing in the first-ever video game world championship. On March 19, 1983, players from around North America came to Twin Galaxies to join representatives of Atari, the Amusement Game Manufacturers Association

(AGMA), *RePlay* magazine, and *Video Games* magazine as Iowa governor Terry Branstad acknowledged Twin Galaxies' role as the official scorekeeper and crowning Ottumwa, Iowa, as the Video Game Capital of the World.

As Twin Galaxies continued to rank top players, the first national video game team was formed to represent the United States, made up of a select cadre of the very best talent. It was called the U.S. National Video Game Team, and Day, as the founding team captain, issued international video game challenges to Japan, the United Kingdom, and Italy, even hand-delivering proclamations to their respective embassies in Washington, DC. Eventually, the team toured the United States, Europe, and Asia during the 1980s.

By 1985, Twin Galaxies had enjoyed major media coverage in *LIFE* magazine, Marvel Comics, the *Wall Street Journal*, *USA Today*, *Stern* magazine, and the *Washington Post* and had had nearly one hundred TV appearances, including ABC-TV's *Entertainment Tonight* and *NBC Nightly News*. As Twin Galaxies' fame spread further, Walter Day was designated an assistant editor in charge of video game scores for the 1984–86 editions of the U.S. edition of *The Guinness Book of World Records*. After Guinness World Records decided to cease coverage of video game scores in its books, Twin Galaxies, under Day's direction, wrote the first official rulebook for playing electronic games and established the rules and standardized settings for each game. Today, this rulebook has evolved into Twin Galaxies' most well-known product: *Twin Galaxies' Official Video Game & Pinball Book of World Records*, a two-volume edition totaling fifteen hundred pages and containing scores from players in thirty-one countries that had been compiled since 1981. Guinness World Records officially recognized Twin Galaxies as the authority on all video gaming scores and records and, in 2008, began importing its database of champions into the annual *Guinness Gamer's Edition*, a book highlighting myriad video gaming scores and achievements.

By the turn of the millennium, Day would find himself considering retirement as well as attempting another passion, creating his own music. In 2006, successful business owner Pete Bouvier became involved with Twin Galaxies, and at the start of 2007, he became the CEO and owner operator of the company under its new name, *Twin Galaxies International*. Bouvier has transformed the company into a professional services organization that is called on to adjudicate video game world records and facilitate contests and tournaments for major gaming companies. The company employs a worldwide staff of referees and writers, allowing it to cover video gaming events happening all over the globe.

In 2014, Jace Hall became the new owner of Twin Galaxies, and a new website for the company appeared in April of that same year. The website includes discussion for a high score database.

Today, Twin Galaxies International is recognized as the world's premiere electronic games referee, providing governance for the video gaming industry. It covers arcades, home consoles new and old, computer games, pinball, handhelds, and portables, and it will be tracking mobile phone gaming in the near future. Twin Galaxies International sets and enforces the rules for gameplay, validates and retains the scores and achievements, and maintains the integrity of fair play across the sport of competitive video gaming.

In the foreseeable future, Twin Galaxies International has plans to release the first trading card set of video gaming champions from across the globe, and it will begin issuing licenses to gaming establishments, enticing players to visit and attempt world record scores. As previously noted, it will also begin tracking scores on one of the newest video gaming platforms that has really gained a foothold in the market: mobile phones. The company will also continue to have a major presence at the Big Bang event held annually at the International Video Game Hall of Fame located in Twin Galaxies' birthplace, Ottumwa, Iowa.

David Nelson

See also: World Video Game Hall of Fame

Further Reading

Twin Galaxies website. Accessed September 25, 2020. Available at http://www.twingalaxies.com.

Twitch

Founded in June 2011 as a spin-off of Justin.tv, Twitch (also known as Twitch.tv) has become the major livestreaming video platform and is now owned by Twitch Interactive, a subsidiary of Amazon.com. The platform is mainly used for video game livestreaming and esports competitions. It gets its name from *twitch gameplay*, a style of fast gameplay that tests players' reflexes and quick reaction times.

After being spun off from the general-interest platform Justin.tv, Twitch was established as a separate platform and supported by venture capitalists who invested $15 million in 2012 and $20 million in 2013, after which Twitch became profitable. After that, Twitch became the dominant venue of the esports boom, broadcasting most major tournaments. Twitch was so important to esports that it was integrated into the hardware of the Microsoft Xbox One and the Sony PlayStation 4, and this has led some critics to suggest that it has a near monopoly on the market (Popper 2013).

By mid-2013, Twitch's user base had grown to around forty-three million unique visitors a month, and in August 2014, Amazon.com acquired Twitch Interactive for $970 million. In December of that year, Twitch acquired GoodGame Agency, the owner of two esports teams, the Seattle-based team Evil Geniuses, who won the International 2015 (an annual *Dota 2* [2013] championship), and the Swedish team Alliance, who later left GoodGame Agency to become a player-owned team in 2016.

Twitch has also broadcast professional sports, including the G League games of the National Basketball Association (NBA) since 2017, and the following year, Twitch featured some Thursday Night Football games in an agreement with the National Football League (NFL).

Since its first event in 2015, Twitch has also run TwitchCon, an annual convention for Twitch users that promotes the platform and video livestreaming. In April 2017, Twitch also launched an Affiliate Program that allows fans to support streaming channels. At the start of the program, affiliates were required to have at least fifty followers and five hundred minutes broadcast, seven unique broadcast days, and an average of at least three concurrent viewers, all within the last thirty days at the time of application (Fontaine 2017).

Although blocked in China as of September 2018, Twitch remains the dominant video game streaming platform in the rest of the world and is well positioned to remain an influence on the further growth of the esports industry.

Mark J. P. Wolf

See also: Esports; Streaming

Further Reading

Fontaine, Robin. "Twitch Affiliate Program Launches Today! First Invites Going Out . . . ." Twitch, April 24, 2017. Available at https://blog.twitch.tv/twitch-affiliate-program-launches-today-first-invites-going-out-9c020994a042.

Gartenberg, Chaim. "Twitch's New Subscription Model Will Let Fans Pay Streamers Significantly More Money." The Verge, April 19, 2017. Available at https://www.theverge.com/2017/4/19/15359244/twitch-new-subscription-model-tiers-more-money-streamers.

Popper, Ben. "Field of Streams: How Twitch Made Video Games a Spectator Sport: An Upstart Streaming Service Is Now an Omnipresent Monopoly." The Verge, September 30, 2013. Available at https://www.theverge.com/2013/9/30/4719766/twitch-raises-20-million-esports-market-booming.

"Twitch.tv." Wikipedia. Updated September 23, 2020. Available at https://en.wikipedia.org/wiki/Twitch.tv#cite_note-21.

U

Ubiquitous Games

Ubiquitous games extend the alternate worlds of video games into the physical world by taking the gaming experience into everyday spaces and contexts. Players interact with ubiquitous games across multiple media platforms, from clue-embedded websites and documents hidden on servers to mobile phones, global positioning systems (GPS), phone booths, classified advertisements, billboards, and so forth. Rather than the space of the game being confined to a computer-generated world, ubiquitous games consist of both virtual and actual locations that the game's designers may or may not designate in advance as the playing fields. The designers may limit the time of play to a certain period, or the game may have no set temporal parameters. These types of games are related to, and sometimes synonymous with, pervasive games and alternate reality games (ARGs); ubiquitous games, however, take explicit cues from the philosophy of ubiquitous computing.

Some examples of ubiquitous games include *Can You See Me Now?* (2001) from Blast Theory and Mixed Reality Lab, *PacManhattan* (2004) by Frank Lantz and his students, and *I Love Bees* (2004) by 42 Entertainment. In *Can You See Me Now?*, participants from around the world played the game in an online virtual version of the city of Sheffield, England, although other participants used handheld computers to track the locations of the online players and chase them through the actual streets of the city. The online players used GPS technology to evade the runners in the streets. In 2004, Frank Lantz and his students at New York University's Interactive Telecommunication graduate program designed a version of the iconic *Pac-Man* (1980) video game that would take place on a grid of streets around Washington Square Park in New York City. In *PacManhattan*, a player dressed like Pac-Man runs through the streets attempting to collect all of the "dots," with four players dressed as the ghosts in pursuit. The players, equipped with mobile phones, keep in contact with a person in the control room, who updates the location of the player through mapping software. *I Love Bees* was created for Microsoft's launch of the video game *Halo 2* in 2004, and the URL ilovebees.com appeared in theatrical trailers for *Halo 2*. When players visited the site, they found what appeared to be a website about beekeeping that had been hacked by artificial intelligence (AI). Following clues that were released over a few months on the website, players were directed with GPS coordinates to pay phones, where they listened to chapters of a *Halo*-related audio drama that eventually revealed more clues and the solution to the mystery.

Although ubiquitous games can range from art projects to viral marketing campaigns, they all share the common theme of finding pleasure in interweaving the game world into the physical world. Similarly, ubiquitous computing seeks to decentralize the personal computer as the site of computing and to extend the interface into unexpected and everyday objects, such as clothing, buildings, and items in the supermarket. Transforming the banal into the fantastic, ubiquitous games follow this logic by embedding game elements into nongame objects and into the everyday lives of players. Ubiquitous games also share similarities with urban games played by the Situationists, an international group of writers, artists, and theorists associated with European avant-garde art movements and Marxism. In the mid-twentieth century, the Situationists played elaborate games in public urban places to create alternative spaces in everyday life for the articulation of desires that countered capitalist conditions. The deliberate amplification of gaming beyond the magic circle in ubiquitous games emphasizes the idea that we already live in a game-infused culture and speak of many aspects of life as games to be played.

Aubrey Anable

See also: Augmented Reality; Pervasive Games; Virtual Reality

Further Reading

Blast Theory. "Can You See Me Now?" Accessed September 25, 2020. Available at http://www.blasttheory.co.uk/bt/work_cysmn.html.

42 Entertainment. Available at http://www.42entertainment.com/.

Gold, Rich. "This Is Not a Pipe." *Communications of the ACM* 36, no. 7 (1993). Available at https://go.gale.com/ps/anonymous?id=GALE%7CA14045443&sid=googleScholar&v=2.1&it=r&linkaccess=abs&issn=00010782&

Kampmann Walther, Bo. "Pervasive Gaming: Formats, Rules, and Space." *Fibreculture Journal* 8 (2006). Available at http://journal.fibreculture.org/issue8/issue8_walther.html.

Lantz, Frank, and students. *PacManhattan*. Accessed September 25, 2020. Available at http://pacmanhattan.com.

Wark, McKenzie. "Agony (on *The Cave*)." In *Gamer Theory*, 11–28. Cambridge, MA: Harvard University Press, 2007.

Ubisoft

Ubisoft, properly named Ubisoft Entertainment SA and formerly Ubi Soft Entertainment SA, is a French video game company. Originally based in Carentoir (French Brittany), the Guillemot family sold agricultural supplies and equipment for local farmers. Every child in the family, following their mother's will, went into business studies or got a university degree in economics: Claude (born in 1956) and Michel (born in 1959), at EDHEC (Écoles des hautes études commerciales); Yves (born in 1960) at IPME (Institut de la PME); Gérard (born in 1961) at EBS (European Business School); and the youngest, Christian (born in 1966), followed an economics program at the University of Rennes. All of them worked for the family business during their youth and learned how to manage marketing, sales, and accounting.

At the end of the 1970s, the family business faced difficulties and had to choose a new sales market. The oldest of the brothers diversified the original business to include computers, professional software sales, and even audio CDs. Guillemot International Software, founded in 1984 and headquartered in La Gacilly (French Brittany), worked as a mail-order seller and then as a wholesaler, shipping British software and computers to the French market. Identifying video games as a growing market, the Guillemot brothers founded Ubi Soft on March 28, 1986, and established its new headquarters in Créteil, in Paris's suburbs.

The first video game published by Ubi Soft, *Zombi* (1986), was inspired by George A. Romero's *Dawn of the Dead* (1977). Many of the first Ubi Soft titles took inspiration from popular movies, such as *Manhattan 95* (1986), after John Carpenter's *Escape from New York* (1981), with a hero named Snail Lispken, or *Peur sur Amityville* (1987), after the movie *The Amityville Horror* (1979). Ubi Soft also produced heroic fantasy and role-playing games (RPGs), with a series named *Le logiciel dont vous êtes le héros*, after the French gamebook collection *Le Livre dont vous êtes le héros*: *Fer & Flamme* (1986), *Le Nécromancien* (1987), *L'Anneau de Zengara* (1987), and *Le Maître des âmes* (1987). And like other French publishers, Ubi Soft adapted Franco-Belgian comics (*bande dessinée franco-belge*), including Franquin's *Gaston Lagaffe* and Italian comics such as Tanino Liberatore's *RanXerox*. The company published titles created by experienced authors coming from French concurrent companies, such as FIL and Rainbow Production. Ubi Soft also signed distribution deals for its own titles to be released in Spain and West Germany as it started importing games, such as Elite Software's *Commando* (1985) and its port of SNK's *Ikari Warriors* (1986), for distribution in France.

During the years 1987–88, Ubi Soft experienced new production management in château de La Grée de Callac, a castle near Monteneuf in French Brittany. To supervise game coding, facilitate technical exchanges between programmers, and ensure project deadlines, Ubi Soft gathered young people to create development teams. For a few weeks, often in the summer, programmers were fed and housed to remain focused on a game's production. This established a new publishing model in France—differing from the standard model where an author proposes a game to a publisher—an integrated model, where a publisher assumes production costs and the game programmers' salaries. At the time, Ubi Soft began to work with American publisher Epyx.

In 1988, Yves Guillemot became Ubi Soft's chief executive officer and relocated activities to Montreuil in 1994, establishing a studio with over one hundred employees. Targeting video game console markets such as those of the Atari Jaguar and Sony PlayStation, *Rayman* (1995), created by Michel Ancel, was released in 1995 to critical and commercial success and a worldwide audience. In the 1990s, Ubi Soft began its international expansion, raising funds in 1996 through a stock market launch and establishing worldwide development studios in Annecy (France, 1996), Shanghai (China, 1996), Montreal (Canada, 1997), and Milan (Italy, 1998).

In the 1990s, Ubi Soft produced games as French comedy tie-ins (e.g., for Luc Besson's productions) and then, in the 2000s, Hollywood movie tie-ins for films that included Disney's *Dinosaur* (2000), DreamWorks Animation's *The Road to El*

Dorado (2000), and multiple Sony Pictures Animation films as well as blockbusters and action movie adaptations, such as McG's *Charlie's Angels* (2000) and Tim Burton's *Planet of the Apes* (2001). The adaptations of Peter Jackson's *King Kong* (2005) by Michel Ancel and James Cameron's *Avatar* (2009), developed in Montréal, were the most important tie-in projects carried out by Ubi Soft at the time, the latter having disappointing sales results. In December 1999, Ubi Soft cofounder Michel Guillemot took aim at the mobile games market by founding Gameloft SE.

On September 9, 2003, Ubi Soft simplified its name to Ubisoft and introduced its new logo, known as "the swirl." In the 2000s, Ubisoft also began to develop its own successful video game franchises, including *Prince of Persia*, *Assassin's Creed*, *Far Cry*, *Just Dance*, *Raving Rabbids*, and multiple Tom Clancy franchises, including *Rainbow Six*, *Ghost Recon*, *Splinter Cell*, and, in the 2010s, *The Division*. At the same time, Ubisoft continued to collaborate with French authors, such as Michel Ancel (*Beyond Good & Evil* [2002]), Eric Chahi (*From Dust* [2011]), and Yoan Fanise and Paul Tumelaire (*Valiant Hearts: The Great War* [2014]). In 2011, Ubisoft Montpellier developed UbiArt Framework, a 2.5-D video game engine used for *Rayman Origins* (2011), a platformer reboot, and other artistic projects, including *Child of Light* (2014). Ubisoft also developed other tools, such as the game engine AnvilNext, for the *Assassin's Creed* series, and the Dunia Engine, for the *Far Cry* series, as well as the digital distribution, digital rights management, and multiplayer service Uplay.

Ubisoft faced hostile takeover attempts in the 2000s and 2010s, first by rival company Electronic Arts (EA), which purchased a 19.9 percent stake in the firm in December 2004. EA ended up selling the shares in 2010. In 2015, Ubisoft was targeted by French media company Vivendi, which was attempting the acquisition to expand its media properties. Vivendi acquired stakes in both Gameloft, an Ubisoft sister company, and shares in Ubisoft. Fearing a hostile takeover, Yves Guillemot asked for Canadian investors and raised the family stake in Ubisoft more than 13 percent and the assured voting share to 20 percent. Vivendi continued to buy shares in Ubisoft, gaining 23 percent in September 2016, then holding a 27.15 percent stake in Ubisoft. On March 20, 2018, Ubisoft and Vivendi negotiated a deal ending any potential takeover. Vivendi sold its shares by March 2019. Chinese company Tencent then purchased shares in Ubisoft.

Since 2000s, Ubisoft has become one of the largest video game publishers after Activision Blizzard, EA, and Take-Two Interactive in terms of revenue and market capitalization, and it claims to have one of the largest in-house development team, with more than fourteen thousand employees working in over forty studios. The company set up the in-house studios Ubisoft Montreal, Ubisoft Toronto, Ubisoft Bucharest, and Ubisoft Shanghai, and it also acquired several studios across the world, such as Massive Entertainment (Sweden), Red Storm Entertainment (United States), Reflections Interactive (England), and RedLynx (Finland).

Alexis Blanchet

See also: France

Further Reading

Blanchet, Alexis. "France." In *Video Games around the World*, edited by Mark J. P. Wolf, 175–192. Cambridge, MA: MIT Press, 2015.

Blanchet, Alexis, and Guillaume Montagnon. *French Touche. Une histoire du jeu vidéo en France (1960–1991)*. Houdan, France: Pix'n Love, 2019.

Ultima Series

The *Ultima* series is one of the longest-running computer game franchises of all time. It consists of both single-player fantasy role-playing games (RPGs) and the massively multiplayer online role-playing game (MMORPG) *Ultima Online* (1997) as well as their multiple expansion packs. Launched by then fledgling game designer Richard Garriott in 1980, when Garriott was still a university student, the series is now owned by major game developer and publisher Electronic Arts (EA). Although the single-player *Ultima* games were widely credited with pioneering the computer game genres of the RPG and the graphical adventure game, *Ultima Online* has been lauded for popularizing the MMORPG and, in so doing, introducing an entire generation of players to the experience of residing in and navigating a persistent multiuser virtual world. On the whole, the series has been acclaimed for the open-endedness of its gameplay, the degree of choice it allows players in terms of customizing character appearance, capability, and morality and the detailed expansiveness of its game world. Although a new single-player version of the series has not been produced since 1999, at the time of this writing, EA has continued to maintain and update *Ultima Online* through multiple expansion packs and client upgrades, and, despite having been surpassed by more recent MMORPGs in terms of popularity, *Ultima Online* still retains a dedicated user base.

From its inception, the *Ultima* series was instrumental in adapting the rules, gameplay, and fantasy settings of the tabletop RPG (embodied most famously at the time by Dungeons & Dragons [1974]) to the realm of the computer game, helping to shape the RPG into one of the most robust computer game genres of all time. Although their specifics vary from game to game, computer RPGs typically allow players to create and customize a developed character persona defined by such traits as species, race, gender, and occupation as well as abilities, such as strength and dexterity, which tend to be highly relevant to gameplay (Wolf 2005, 202). Following the success of the first graphical adventure game, *Adventure* (1979), the *Ultima* series was also one of the first graphically based adventure game series, wherein player characters may move somewhat freely through the (usually fantastic or historic) settings of the game world, pursuing multistep objectives typically more complex than simply shooting, evading, killing, or catching one's opponent (Wolf 2005, 196). Unlike text-based adventure games that relied on written descriptions to convey the action of gameplay, *Ultima* utilized graphics, including on-screen controllable characters and navigable digital spaces, which, despite their initial simplicity, heightened the player's sense of immediacy in the game action. It was also the first home computer game to permit scrolling in both vertical and horizontal directions, allowing players to move through a larger playing field than what could be viewed on-screen at any given time (Wolf 2007, 83).

The first *Ultima* (California Pacific, 1980) set the basic template for the series by enabling a high degree of flexibility for players in creating their characters, allowing them to choose different fantastical races and classes, each with its own special abilities and shortcomings. Player characters moved through the game's fictional medieval world, gaining character-enhancing experience points through successful battles and ostensibly moving toward the goal of defeating an evil warlord who had enslaved the kingdom. However, rather than being forced to adhere to a strictly linear quest structure, players could go about achieving this goal in different ways and had some freedom to explore the various landscapes and dungeons of the game world. Players also had to manage such mundane resources as money and food in the process. On the whole, Garriott has described his game design philosophy as being world focused rather than story focused, suggesting that the story of each of the games in the single-player RPG series is meant to showcase the world of the game rather than a specific sequence of narrative events. Garriott has cited J. R. R. Tolkien's exhaustively realized Middle-earth as one inspiration for this approach (Kolbert 2001).

Ultima II: Revenge of the Enchantress (Sierra On-Line, 1982) innovated gameplay by allowing player characters to talk to non-player characters (NPCs), and its packaging also featured a detailed cloth map of the game world, which would become a trademark of subsequent *Ultima* releases. Garriott and his brother Robert used the money earned from the first two *Ultima* games to create Origin Systems, which would publish *Ultima III: Exodus* (1983) as well as all the remaining titles in the series, until Garriott sold Origin to EA for $30 million in 1992. Besides introducing the ability to create and guide a multiperson party through the game, *Ultima III* was also noteworthy as the last game in what had been dubbed the "Age of Darkness" trilogy in the series. The subsequent three games (*Ultima IV: Quest of the Avatar* [1985]; *Ultima V: Warriors of Destiny* [1988], and *Ultima VI: The False Prophet* [1990]) would make up the highly successful "Age of Enlightenment" trilogy, which refocused the role-playing elements of the series somewhat to facilitate a greater emphasis on morality, with players able to choose a player class that reflected their own moral views and possessed different virtues (including compassion, honesty, and justice) that would be mobilized in the course of gameplay. The acclaimed, two-part *Ultima VII* (*Part I: The Black Gate* [1992] and *Part II: Serpent Isle* [1993]) shifted the series toward real-time combat on the battlefield (versus the turn-based combat of its predecessors), with the last two games in the series (*Ultima VIII: Pagan* [1994] and *Ultima IX: Ascension* [1999]) downplaying role-playing elements somewhat in favor of foregrounding action-based combat and adventure game mechanics. The long-delayed *Ultima IX* was widely considered a costly failure and has been blamed as a contributing factor in the demise of the single-player facet of the series.

Although the single-player *Ultima* games wound down in the late 1990s, *Ultima Online*—the fantasy MMORPG launched by Origin and EA in 1997—moved the series into an entirely new realm of both commercial popularity and cultural significance. *Ultima Online* took the vast medieval storyworld of the single-player series and moved it into a visually lavish, persistent online multiuser environment. Although it maintained the series' role-playing roots, as per the new demands and possibilities of its persistent online nature, gameplay became decidedly more open-ended and directed toward a greater diversity of tasks, ranging from heated player-versus-player (PvP) confrontations and real-time combat to the minutia of decorating an avatar's home and wardrobe. As such, it demanded a high degree of personal investment from players, fostering a greater sense of immersion in (and commitment to) the game world. For many players, this commitment entailed spending more time in the *Ultima Online* game world than they had in any previous game and, in some more extreme cases, becoming almost as invested in their virtual lives as they were in their real ones.

As T. L. Taylor (2006) has pointed out, while *Ultima Online* was not the first graphical multiuser game world to blend the long tradition of text-based online multiplayer games such as MUDs with graphical visual spaces—*Meridian 59* (3DO, 1996) and *Diablo* (Blizzard, 1996), for example, allowed users to enter into a graphical space and play with others in real time—*Ultima Online* tends to be seen as the breakthrough game of the MMORPG genre because of its intense and almost immediate popularity, its success in creating a rich and fully realized game world, and the lively player culture it cultivated. Despite struggling with multiple system crashes during the initial mass influx of players, it quickly reached and surpassed the one hundred thousand subscribers mark, far surpassing the player populations previously seen in multiuser domains (MUDs) and other graphical worlds. In addition to their investment in the original game software, each player paid $9.95 per month to maintain access to the game, demonstrating to other game companies how the online subscription model of the MMORPG could be highly lucrative.

Ultima Online also raised and confronted many of the key issues still faced by MMORPGs to this day, including community management, mass player protest, and "griefing" (intentionally disruptive play), as well as the challenges of managing a "real" economic system in a virtual world. For example, *Ultima Online* was the first MMORPG to allow players to buy and sell virtual in-game objects for real money, a practice that has continued and flourished in persistent online worlds such as *Second Life* (2003) and *World of Warcraft* (*WoW* [2004]). Julian Dibbell (2006) has chronicled his efforts to make a living through such transactions, contending that MMORPGs like *Ultima Online* demonstrate how the boundaries between "work" and "play" are being blurred in our increasingly networked society.

The success of *Ultima Online* spawned multiple imitators, the most famous of which, Sony's *EverQuest* (1999), quickly surpassed its predecessor in terms of both subscriber numbers and critical acclaim. However, *Ultima Online* still maintains a dedicated user base, with EA continuing to commission expansion packs and client upgrades. For example, in 2007, on the ten-year anniversary of its release, EA launched the ambitious *Ultima Online: Kingdom Reborn*, which expanded game content and sought to make its interface and graphics comparable to those of contemporary MMORPGs while maintaining the consistency of the *Ultima Online* world.

Jessica Aldred

See also: Immersion; Packaging; Role-Playing Games; Subcreation

Further Reading

Dibbell, Julian. *Play Money*. New York: Basic Books, 2006.

Kasavin, Greg, and Tim Soete. “The Ultima Legacy: Past and Future.” GameSpot, December 30, 1998. Available at http://www.gamespot.com/features/ultima/index.html.

Kolbert, Elizabeth. “Pimps and Dragons: How an Online World Survived a Social Breakdown.” *The New Yorker*, May 28, 2001. Available at http://www.newyorker.com/archive/2001/05/28/010528fa_FACT?currentPage = all.

Loguidice, Bill, and Matt Barton. “Ultima (1980): The Immaculate Conception of the Computer Role-Playing Game.” In *Vintage Games: An Insider Look at the History of Grand Theft Auto, Super Mario, and the Most Influential Games of All Time*, 335–352. Burlington, MA: Elsevier, 2009.

Taylor, T. L. *Play between Worlds: Exploring Online Game Culture*. Cambridge, MA: MIT Press, 2006.

Wolf, Mark J. P. “Genre and the Video Game.” In *Handbook of Computer Game Studies*, edited by Joost Raessens and Jeffrey Goldstein, 193–204. Cambridge, MA: MIT Press, 2005.

Wolf, Mark J. P., ed. *The Video Game Explosion: A History from Pong to PlayStation and Beyond*. Westport, CT: Greenwood Press, 2007.

Unit Operations

Unit operations is a term used by Ian Bogost to describe how the component functions of systems produce meanings. *Units*, a nonspecific term for any discrete instantiation of some material form, are building blocks that construct a system. These units can be as minute as the binary circuit in a light switch or as broad as an entire city power grid to which that switch is attached. Packet-switching protocols and fiber-optic lines are both units of the system of the internet. Historically received racial prejudices and statist legislation establishing racial discrimination each act as units in the apartheid system. *Operations* are any processes that perform transformative work, generating new output from input. Balancing a chemical equation, releasing a car’s handbrake, apologizing to a friend, and appropriating money for health care are all operations. An operation is the logic that underlies a unit, the way it behaves.

As a framework for studying video games, unit operations offers a model for how individual components of the system that comprise the game produce meaning, both individually and together. Methods of analysis that embrace unit operations focus on the relationships between inputs, processes, outcomes, and interpretations to explain what a game is doing; *unit analysis* is the term for this practice (Bogost 2006). When we play a game, we do not discuss it in terms of a single synthesized result but rather the processes we engage with—and particularly how the processes in the game relate to processes outside of it.

SimCity (1989) offers an example. A high-level explanation of the game as a “city planning simulator” offers little in the way of saying what it means to play or what “city planning” means in *SimCity*’s case. However, by engaging the system closely at the level of discrete units in relationship to one another, we can better understand the game. Furthermore, by understanding the game's unit operations in relation to those outside the game (such as actual city planning practices and lived experiences in cities), we can draw conclusions about the way *SimCity* works representationally.

For example, many of the rules that govern the game's mechanics are derived from Jay W. Forrester's book *Urban Dynamics* (1969). When he created the game, Will Wright implemented a simulation of a specific operational model of the city structure embedded in the software code. Understanding the individual elements —the bonuses given for building mass transit, citizen happiness, and the tax rate —determines meaning and success. The game responds as the player makes changes, sometimes hidden transparently in the underlying dynamics and other times presented opaquely in the interface. The unit operations of cellular automata and urban dynamics are related through the work that is *SimCity*.

Unit analysis can also help us understand supposedly narrative games. *Grand Theft Auto: Vice City* (2002) is not simply a playable story with a climactic ending in which Tommy Vercetti defends his position at the top of the Southern Florida crime scene. Rather, it is a game of crime missions and open-world play, both of which can be broken down even further into the mechanics that define them in relation to the worldly processes they depict.

The software-based unit operations in *GTA: Vice City* include the ability to steal cars, the rules that govern the use of weapons, the algorithms that determine police warning levels, the choice of historical and geographic setting, the relative freedom the player has to drive around the city, the need to accept missions from characters to progress the game, pedestrian artificial intelligence (AI), the inclusion of unmarked stunt ramps, the player's inability to swim, the day-night cycle, the in-game radio stations, and so on. The configuration of these units—both within the game and in relation to external references or interpretive acts—exemplifies an analysis built on unit operations.

Hardware and software are often important when considering the meaning of a software artifact. *GTA* uses an algorithm that determines the draw distance of objects and buildings and produces a hazy landscape beyond said radius. The spawning of pedestrians and cars is governed by this distance, which means players cannot stand atop a building far away and use a sniper rifle to complete all their kill-based objectives. Likewise, the division of the game into islands is a design strategy to limit the player's mobility, but it also helps to overcome the memory limitations of the disc-based Sony PlayStation 2 hardware. The designers implemented loading screens between the eastern and western islands so that information could be read from the disc and stored memory. The code need not worry about having to draw more than a cursory skyline of downtown when the player was roaming Vice Point, so more processing power could be devoted to immediate needs. Rather than freeze the game on-screen, the developers chose to create "Welcome to Vice City" postcards for the loading screen, which provides further character to the colorful city. Because this hard stop created a break in the action, most missions do not require crossing the loading boundaries.

Bogost details first-person shooting game engines as vivid examples of unit operations influenced by hardware and software (Bogost 2006). In making *DOOM* (1993), Id Software created not only a wildly successful game but also a framework for making the genre of game *DOOM* had popularized. The technical accomplishments of *DOOM* exist both inside and outside the game; Id Tech 1, the engine that powered the three-dimensional drawing of *Doom*'s world and object interactions, became the basis of a handful of other Id Software games. While creating its next game, *Quake* (1996), Id Software set out to not only design a game but also to build an engine to be licensed to other developers that consisted of core operations. This codebase enabled the critically acclaimed *Half-Life* (1998), for example. An analysis of either game would take into account the operations of the core functions as well as what these operations enable.

Bobby Schweizer and Ian Bogost

See also: Rules

Further Reading

Bogost, Ian. *Unit Operations*. Cambridge, MA: MIT Press, 2006.

Starr, Paul. "Seductions of Sim: Policy as a Simulation Game." *American Prospect* no. 17 (Spring 1994): 19–29.

United Arab Emirates (UAE)

On the eastern edge of the Middle East, Imaginations FZ, LLC, was founded in Dubai (United Arab Emirates) in 2003 and managed to create two games before it shut down in 2005: *Legend of Zord* (2003), featuring stories from the *Arabian Nights*, and *Wadi Basheer* (2005), a poor racing game with a Middle Eastern twist.

The media and entertainment hub Twofour54, the representative of the Media Zone Authority of Abu Dhabi, was founded in 2008 with the aim of creating a local Silicon Valley by supporting content creation in the region. Starting in 2013, it managed to attract some major international studios; Ubisoft Abu Dhabi was established there and developed *NCIS: Hidden Crimes* (2014). However, it was extremely hard to attract the local talent, and so "investment to relocate" packages were offered, a policy that attracted many game studios that were seeking growth investments, such as Falafel Games, Tahadi, Jawaker, and Crazy Piranha.

Tahadi, based in Dubai UAE, was a major publisher of online games; it localized and operated the famous massively multiplayer online role-playing games (MMORPGs) *Runes of Magic* (2009), *Ragnarok Online* (2002), *Crazy Cart* (2009), and *Heroes of Gaia* (2010). However, unable to catch up with the rise of mobile gaming, it was acquired by Falafel Games in 2014.

Radwan (RAD) Kasmiya

See also: Middle East

Further Reading

Falafel Games website. Accessed September 25, 2020. Available at http://www.falafel-games.com.

Jawaker website. Accessed September 25, 2020. Available at https://www.jawaker.com/en.

Twofour54 website. Accessed September 25, 2020. Available at https://www.twofour54.com/en/.

United Kingdom

While the earliest British games can be traced back to chess- and checkers-playing programs in the late 1940s, it would take until the early 1970s for video games to become commercially available in the United Kingdom. Video games started appearing on the British market around 1973, when Atari opened a short-lived sales office and Magnavox began exporting its Odyssey console to Europe. The following year, homegrown ball-and-paddle home game consoles began to appear with the arrival of the Videomaster Home T.V. Game and the Videosport MK2 console created by hi-fi retailer Henry's. In 1976, the ongoing popularity of these dedicated consoles led General Instruments in Scotland to develop the AY-3-8500 integrated circuit, a generic chip with several built-in bat-and-ball games. The AY-3-8500 and its games became the basis of many of the hundreds of *PONG*-type consoles released across the world in the second half of the 1970s.

Another important development in Britain during the 1970s was the creation of the text-based online multiplayer role-playing game *MUD* (1978), short for "multiuser dungeon" (or "dimension"). Developed by Richard Bartle and Roy Trubshaw at the University of Essex, *MUD* went on to be the foremost influence on the development of the massively multiplayer online role-playing game (MMORPG) genre.

Despite these developments, video gaming in the United Kingdom largely remained limited to the consoles and coin-operated games created in the United States and Japan. However, this changed in 1980 when Cambridge-based Sinclair Research launched the ZX80 home computer. Although basic even for its time, the ZX80 was the first home computer priced with the mass market in mind. The ZX80 and the following year's successor, the ZX81, went on to sell more than 1.5 million units. Around the same time, the country's tax-funded broadcaster, the BBC, and the UK government began a major push to encourage computer literacy among the British population that included TV programs, encouraging computer lessons in schools and the development of the BBC Micro computer.

As the wider applications of home computing remained unclear at the time, games rapidly emerged as the primary use. And with no games available to buy, many of the new computer owners started creating games themselves. Initially, these homebrew games were made available as code listings in magazines or as cassette tapes sold via mail order or at computer fairs. By 1983, retail stores were stocking games for the market-leading computers: the Sinclair ZX Spectrum, the Dragon 32, the Commodore 64, the BBC Micro, and, from 1984 onward, the Amstrad CPC. The dominance of British-made computers made it difficult for more established U.S. and Japanese computer game publishers to enter the market, allowing the United Kingdom more time to build an industry of its own.

As the United Kingdom's game industry primarily began as a by-product of self-taught computer enthusiasts rather than entrepreneurs or investors, British games of the time often reflected British cultural influences or programmers' desire to push the limits of what computers could do. Examples include the wireframe three-dimensional galaxies contained within *Elite* (1984) and the references to the miners' strike in *Wanted! Monty Mole* (1984).

By the 1990s, however, the UK industry had become the home of Europe's biggest game publishers, such as Ocean Software and U.S. Gold. The influence of British games was starting to be felt internationally as well, thanks to the globally popular "god game" *Populous* (1989), Leicestershire-based Rare's status as a leading developer of console games, and Nintendo's hiring of London's Argonaut Software to develop its understanding of three-dimensional graphics.

The early to mid-1990s also saw the United Kingdom's choice of game hardware platforms steadily move into line with the rest of the Western world. British-made computers gave way to the U.S.-made Amiga and Atari ST and then to PCs. In parallel, home consoles started gaining significant market share. By the late 1990s, home gaming in the United Kingdom was largely divided between Windows PCs and Sony's PlayStation. The decade also saw the entire games industry undergo a process of consolidation and globalization that resulted in most leading British game publishers being bought out by better-financed foreign rivals.

While there were challenges in adapting to the costs of developing games with 3-D graphics and CD-based audio and video content, British game developers fared better producing globally significant games such as *Lemmings* (1991), *Theme Park* (1994), *Donkey Kong Country* (1994), *WipEout* (1995), *Tomb Raider* (1996), and *GoldenEye 007* (1997). However, with the video game industry now increasingly globalized and the cost of game creation rising into the millions of dollars, UK game studios moved away from developing games heavily influenced by British culture.

Since the 2000s, the United Kingdom has remained a significant developer of video games and has been responsible for major video game series, including *Grand Theft Auto*, *Total War*, *F1*, *Batman: Arkham*, and *Fable*. Other major UK games include the LEGO games created by Cheshire-based studio Traveller's Tales and the online role-playing game (RPG) *RuneScape* (2001).

Despite this ongoing success, the number of major game studios in the United Kingdom was in decline over the 2010s. Factors behind this included the rising cost of game development, the industry's move toward free-to-play (F2P) mobile games, the impact of the global recession, and several studios that specialized in work-for-hire game development being caught out when the market for it evaporated. A further problem was the UK government being slow to follow the lead of countries such as Canada and France in providing tax incentives for video game development. The government eventually introduced tax relief in 2014, seven years after it was confirmed that such rules do not breach European Union rules. The closure of these larger studios has, however, resulted in the formation of numerous small independent and mobile game development studios that have produced notable games such as *Monument Valley* (2014) and *No Man's Sky* (2016). As such, the United Kingdom remains a major producer of video games and is the sixth-largest video game market in the world.

Tristan Donovan

See also: *Grand Theft Auto* Series; Houser, Sam and Dan

Further Reading

Donovan, Tristan. *Replay: The History of Video Games*. Lewes, UK: Yellow Ant, 2010.

Lean, Tom. *Electronic Dreams: How 1980s Britain Learned to Love the Computer*. London: Bloomsbury Sigma, 2016.

UKIE. "UK Video Games Fact Sheet." 2018. Available at https://webcache.googleusercontent.com/search?q=cache:8CKs7YKU_i0J:https://itresearchfinder.com/catalog/report/uk-video-games-fact-sheet+&cd=1&hl=en&ct=clnk&gl=us.

Wilkins, Chris, and Roger M. Kean. *Ocean: The History*. Kenilworth, UK: Revival Retro Events, 2013.

Wilkins, Chris, and Roger M. Kean. *The Story of U.S. Gold: A Very American British Software House*. Kenilworth, UK: Fusion Retro Books, 2015.

United States of America

As the birthplace of video games and the major producer of them (along with Japan), the United States has had a great influence on the history of video games, which have been shaped by American culture since their inception; thus, a detailed summary of video games in the United States would be a reiteration of much of that history. Since their beginning, the large domestic audience of the United States has provided enough support for the existence and growth of the video game industry, which can be divided into arcade games, console-based games, computer games, handheld games, and online video games. Although video game production companies can be found across the country, they tend to be more numerous in larger cities, such as Los Angeles, New York, and Chicago, as well as other areas, including Silicon Valley, in California, and Austin, Texas, where game production has grown into a subculture. Many large video game–producing companies from other countries, such as SEGA, Sony, and Nintendo, also have divisions or subsidiaries headquartered in the United States.

THE UNITED STATES IN VIDEO GAME HISTORY

The 1880s through the early 1900s saw the rise of arcades as places of entertainment through the introduction of coin-operated amusement devices, including strength testers, slot machines, card machines, racing games, and other "trade stimulators" as well as the coin-operated mutoscopes and kinetoscopes that paved the way of the cinema. Early arcade video games were simple, based on action, and inexpensive to play, making them similar to much early film, which appealed to a wide mass audience of limited means and education that made up a significant percentage of the American public around the turn of the century. One of the most popular types of games to emerge from the arcade was pinball, which became electrified and grew in popularity from the 1930s to the 1950s. Other electromechanical games, housed in upright cabinets, provided the format that would be adopted by arcade video games.

Advances in computer technology after World War II led to many universities housing mainframe computers on their campuses, and experiments on these led to mainframe games. By the 1960s, when the children of the postwar baby boom were reaching college age and experiments in art and computer technology had spread to many campuses, the stage was set for the emergence of video games on mainframe computers, and games such as *Spacewar!* (1962) arose as the result of hacking. During this time, American inventor Ralph H. Baer received a patent for the idea of home video games, resulting in the production of the Magnavox Odyssey in 1972. Also in the early 1970s, *Spacewar!* and Baer's tennis game were adapted by other parties into arcade video games (such as *PONG* [1972], the first hit arcade video game), which were housed in upright cabinets and used arcades as their main venues. The large number of baby boomers, responsible for the growth of youth culture during the 1960s and afterward, and the generation that followed them became the main audience for video games and encouraged their growth in arcades and in the home during the 1970s, when the American game company Atari became dominant in the industry.

Home computer technology of the late 1970s and early 1980s resulted in the rise of home computer games, amateur computer game programming, and homebrew games as well as networked games on bulletin board systems (BBSs) and multiuser domains (MUDs). The rise of blockbuster cinema during this time, along with the development of the franchising and merchandising of popular film and television shows, led to video games that were adaptations of content from other media, and in the 1980s, the video games themselves became the source of character-based franchises that spread to other media (such as those involving *Pac-Man*, *Mario*, and *Zelda*).

After the video game industry crash of 1983, Japanese video games gained prominence with Nintendo of America's introduction of the Nintendo Entertainment System (NES) in 1985. The NES was a version of Nintendo's Famicom system that was released in Japan, which Nintendo reworked specifically to appeal to American retailers, who were wary of new game systems after the crash. The United States would continue to be the leader in the area of home computer gaming due to the domination of IBM, Microsoft, and Apple in the computer industry, although these, too, would find growing international competition. The late 1980s saw the growth of online games, which were becoming available for more and more participants, and they blossomed into massively multiplayer online role-playing games (MMORPGs) a few years after the World Wide Web went worldwide in 1993.

By the early 1990s, advances in computer technology led to, and were encouraged by, the use of computer graphics in all areas of American visual media. Three-dimensionally rendered graphics and photo-realistic textures and lighting allowed computer-generated imagery (CGI) to be integrated into live action, bringing video games and other media ever closer together. Other rapidly growing technologies, such as cell phones and handheld computing devices, opened up new venues for video games, as Americans spent more time commuting and on the move. Most of these venues would be exploited in the following decade, resulting in the popularity of mobile gaming and casual games in the 2000s. The year 2001 would see another American company enter the home console race, with the appearance of the Microsoft Xbox. By the 2010s, the original generation of video game players were nearing retirement age, and video game players could be found across all demographics, which was reflected in the enormous variety of games and game venues.

THE CHARACTER OF AMERICAN VIDEO GAMES

With the wide variety of video games in existence, it is difficult to argue for a cultural resemblance among them all that stems from American cultural values; however, a few broad generalizations can be suggested. First, the highly competitive nature of American society makes for fertile ground for competitive gaming, and it should be no surprise, then, that the majority of video games are competitive ones (as opposed to other styles of play, such as cooperative play or sandbox-style play, which could have become the dominant one but did not). Competition is often involved with the acquisition of goods, property, and position (which at various levels in American culture has resulted in consumerism, materialism, and imperialism), and equivalent activities in video games include the collecting of objects or points and the attaining of high scores or higher levels within a game.

Other noted aspects of American culture, such as its relative extroversion, inventiveness, pioneer spirit, and appetite for novelty, are also apparent in many of the games developed in the United States as well as in the way American game companies are run. Besides competition and acquisition, other themes—such as cultural conflict and development of identity—could be said to correspond to similar concerns in American society. The growing variety of video games and the venues for them ensures that video games will find ways to connect to the culture they are embedded in, and it seems likely that video games will remain an integral part of American culture.

Mark J. P. Wolf

See also: Atari; History of Video Games; Xbox Game Studios

Further Reading

Herman, Leonard. *Phoenix: The Fall & Rise of Videogames*. 3rd ed. Springfield, NJ: Rolenta Press, 2001.

Kent, Steven L. *The Ultimate History of Video Games: From Pong to Pokémon and Beyond*. Roseville, CA: Prima, 2001.

Wolf, Mark J. P., ed. *Before the Crash: Early Video Game History*. Detroit, MI: Wayne State University Press, 2012.

Wolf, Mark J. P., ed. *The Video Game Explosion: A History from PONG to PlayStation and Beyond*. Westport, CT: Greenwood Press, 2007.

Wolf, Mark J. P. *Video Games FAQ*. Montclair, NJ: Hal Leonard Performing Arts Publishing Group, 2017.

Universal City Studios, Inc. v. Nintendo Co. Ltd.

Donkey Kong was originally released in Japan on July 9, 1981, and quickly became a hit in North America (*Nintendo of America* 1982). On June 29, 1982, Universal's lawyers filed suit against Nintendo (*Universal City Studios* 1986). The film *King Kong* (1933) and the video game *Donkey Kong* are both about a giant gorilla who kidnaps a blonde woman and carries her to the top of a tall building. Universal Studios thought this made *Donkey Kong* too similar to *King Kong,* and so, in the spring of 1982, Universal took Nintendo to court, claiming that *Donkey Kong* infringed on its *King Kong* trademark. Despite the clear similarities, Universal lost the case and was eventually forced to pay Nintendo approximately $1.5 million (*Universal City Studios* 1986). To understand why Universal lost the lawsuit, it is necessary to understand the complicated history of *King Kong.*

King Kong was first released by RKO Pictures in 1933. Before the movie was released, the screenwriters released a *King Kong* novel to generate publicity for the movie, and the copyright on this novel eventually fell into public domain. In the 1970s, Universal intended to make a new movie starring King Kong, but when RKO sold the rights to a rival company, Universal sued for the right to make its own King Kong movie (*Universal City Studios* 1986). During this lawsuit, Universal claimed that because the *King Kong* novel was in the public domain, it could make a movie based on that book without RKO's permission. The court agreed with this argument but stipulated that only the material in the novel was in the public domain. Because of this, RKO still owned "'the copyrightable matter' which was contained in the 1933 movie but not in the original novel" (*Universal City Studios* 1986). Years later, perhaps in an attempt to gain some ownership over King Kong, Universal bought the trademark of the name "King Kong" from the son of the novel's author (*Universal City Studios* 1986).

Therefore, Universal may have owned the name "King Kong," but no one owned the idea of a giant ape; it was RKO, not Universal, who owned the famous elements of the King Kong story, such as Kong kidnapping a blonde woman and taking her to the top of a tall building—which were exactly the elements that Universal argued *Donkey Kong* and *King Kong* held in common. This meant that Universal had no case. The judge dismissed Universal's case against Nintendo and forced Universal to pay Nintendo's lawyer fees and damages.

Bryan-Mitchell Young

See also: Nintendo

Further Reading

Nintendo of America, Inc. v. Elcon Industries, Inc., 564 F. Supp. 937 (E.D. Mich. 1982), October 4, 1982. Available at https://law.justia.com/cases/federal/district-courts/FSupp/564/937/1407344/.

Universal City Studios, Inc. vs. Nintendo Co. Ltd., 797 F.2d 70 (2d Cir 1986), July 15, 1986. Available at https://law.justia.com/cases/federal/appellate-courts/F2/797/70/104995/.

Universal City Studios, Inc. vs. Nintendo Co. Ltd., 615 F. Supp. (S.D.N.Y. 1985), July 29, 1985. Available at https://law.justia.com/cases/federal/district-courts/FSupp/615/838/1515073/.

Unlockable Games

Unlockable games are those made available to a player within a "parent" game through the satisfying of one or more particular conditions within that game. Such conditions can include completing the parent game once or more, achieving a certain level of competence, collecting a certain number of in-game bonuses, or even just discovering an Easter egg that makes the unlockable game available for play. Unlockable games typically pay homage to the parent game or the company responsible for the parent game's creation. As such, newer iterations in particular game franchises will often offer unlockable versions of their predecessors.

Examples of games that house unlockable games include *Animal Crossing* (2001) for the Nintendo GameCube, which contained a series of Nintendo Entertainment System (NES) games, such as *Balloon Fight* (1984) and *Ice Climber* (1985; *see* "Retrogaming"), that a player could make available through a number of methods, such as entering an in-game lottery to "win" the games as prizes. In the indie game *Celeste* (2018), a player can even discover and play an original prototype of the game, dubbed *Celeste Classic*, on a computer in an in-game resort's back office.

Unlockable games can either be games that are smaller in scope than the parent title (see Minigames) or full-featured, previously stand-alone games. However, older games included as unlockable games are frequently considered minigames simply because of the relative difference in scope, length, style, and difficulty of play compared to more contemporary titles.

Unlockable games are similar to but should not be confused with *unlockable modes*—levels, difficulties, or minor variations on a game's preexisting goal structure that are made available to a player after he or she meets certain conditions in the game. An ideal example of an unlockable mode is the "Challenge of the Gods" in *God of War* (2005), which changes the linear scenario presented by the game's core mode of play, pitting a player against several rounds of oncoming enemies in an enclosed arena. This mode is only made available after the game has been played through once.

Finally, a game demo may allow the unlocking of the full version after the input of a serial key or some other form of purchase validation. Game demos such as those downloaded on a downloadable content (DLC) network (e.g., Xbox Live) often allow a user to download all of a game's files while only having feature-limited access to the game's content. Full access to such games only becomes available for feature-complete play after validation, thereby "unlocking" the remainder of the game's content. One example of this is Square Enix's *Octopath Traveler* (2018), which allowed the free download of a version of the game for all users. This version allowed players to save several hours of progress with their in-game character, but upon hitting the play limit, it prevented further play until a player purchased the full game. Only after unlocking the full game's content through purchase could a player continue play with his or her saved data.

Nis Bojin

See also: Minigames

Further Reading

Kent, Steven. *The Ultimate History of Video Games: From Pong to Pokémon and Beyond*. Roseville, CA: Prima, 2001.

Salen, Katie, and Eric Zimmerman. *The Game Design Reader: A Rules of Play Anthology*. Cambridge, MA: MIT Press, 2006.

Unreal Engine

The Unreal Engine is a game engine developed by Epic Games that was initially released in May 1998. It is a source-available engine commercial software, with a royalty model for commercial use, and was mainly oriented toward first-person shooting games, even though the last versions are more diversified (the engine also became the basis for a number of role-playing game [RPG] titles, including *Mass Effect* [2007]). The engine's main competitor is Unity (and CryENGINE from Crytek, to a certain extent). The engine's current release is Unreal Engine 4; version 4.20 was released on July 16, 2018.

The Unreal Engine's first generation was developed by the founder of Epic Games, Tim Sweeney (and around sixteen other developers). A fan of Id Software's *DOOM* (1993) and *Quake* (1996), Sweeney wrote a program to create a graphic shell that would allow for a visually high-quality and realistic game environment. The first technical improvement was to switch from 8-bit color (256 colors) to 16-bit color (65,536 colors). After eighteen months of work, a stable version was produced in 1994. The powerful graphic engine, with an optimized rendering system, was called "Unreal" by Tim Sweeney and James Schmalz and was published by GT interactive on May 22, 1998.

Another decision that led to the Unreal Engine's success was the creation of an easy-to-use editor to simplify the level-creation process that would actually include the 3-D game engine: building the tools and game engine together in an editor was one of the key selling points of the product compared to those of competitors. Many special effects were also added due to an unseen physics engine. The Unreal Engine debuted in *Unreal* (May 1998) and was also used in *Unreal Tournament* (November 1999). Soon afterward, the Unreal Engine became the main competitor to Id Software's Quake II engine.

When *Unreal* was released in May 1998, the game was well received by specialized press and the gaming community. However, some gaps and technical issues on the network/multiplayer mode tarnished the game's growing reputation. Epic Games developers created an official extension to correct those issues and to upgrade the network code to optimize multiplayer gameplay. They finally drastically upgraded the rendering system to four times the level of detail (especially on the character's faces). This enhancement was well developed and led to the game *Unreal Tournament*.

At the beginning, Unreal Engine was written in C++ (around 350,000 lines code) and a scripting language called UnrealScript (often abbreviated to UScript and used for 90 percent of *Unreal Tournament* gameplay). UnrealScript was created by Tim Sweeney for programming high-level game concepts provided by the Unreal Engine. It was designed as a strong and simple language and inspired by Java (but without object wrappers for primitive types). However, UScript is twenty times slower than C++, but with low processor use, and is object oriented. It includes native support for time, state, and network replication, which greatly simplifies game programming.

Thanks to its strong object-oriented design, the Unreal Engine is extremely modular: programmers can make massive changes to parts of the game without affecting other features and without affecting source code. Each subsystem is connected to other subsystems through a clearly defined interface, and platform-specific code is consigned to separate libraries. Moreover, the engine's modularity is implemented in the engine's script language. Weapons, pickups, level events, AI nodes, and other world actors are all independent objects.

A programmer using the Unreal Engine. (Savconstantine/Dreamstime.com)

Unreal Tournament's modular package system, coupled with Unreal Editor, makes the game a mod-creation system out of the box, designed to be able to allow additional extensions by gamers, amateur artists, and programmers in recognizing the value of the mod community.

In the Unreal Engine, the world is full at the beginning, and the designer uses it to create the game's universe. This allows the designer to use "portals" to partition his world into very distinct closed zones and offers the possibility, thanks to the potential visibility sets (PVS), to display only the visible parts. Thus, the Unreal Engine allows for intricate interiors and rich exteriors while delivering impressive performance for its time. For the "sky" (the dome above gameplay), Epic adopted the *skybox* system, which is a common process today to represent the sky in real-time 3-D.

Unreal Engine was intended for PlayStation consoles, Dreamcast consoles, and PCs from the late 1990s. Similar to what Id Software did with the Quake Engine, Epic Games made the Unreal Engine 2.0 available under license. Especially popular in the mod developer community, it quickly became the main competitor of the Quake Engine. In addition to titles developed by Epic Games and Digital Extreme, it has been used by many development studios in such games as Ion Storm's *Deus Ex* (2000), Electronic Arts' *Harry Potter and the Philosopher's Stone* (2001), Human Head Studios' *Rune* (2000), and the Collective Inc.'s *Star Trek: Deep Space Nine: The Fallen* (2001), among others.

With the development of Unreal Engine 2, Epic Games chose to broaden its market and made the new engine compatible with the Microsoft Xbox, PlayStation 2, Nintendo GameCube, Nintendo Wii, and SEGA Dreamcast. Home computers were also quickly evolving, but Epic Games wanted its engine to work in both worlds. Unreal Engine 2 was an attempt to build a shared tool that would make multiplatform development possible. The first published title based on Unreal Engine 2.0, and not done internally, was *America's Army* (2002), developed by the U.S. Army and Secret Level.

Due to an agreement with Microsoft, developers had access to the Unreal Engine on Xbox, which led to the version Unreal Engine 2.X, featuring optimizations specific to the Xbox. *Unreal Championship* (2002) on Xbox, using the 2.0 engine version, was mediocre, but *Unreal Championship 2: The Liandri Conflict* (2005) used the 2.X version and met expectations with better console capacities management and visual qualities. Epic Games' licensing strategy resulted in numerous agreements with third-party studios, including Ubisoft (*Tom Clancy's Splinter Cell* series [from 2002 to 2013], including *Rainbow Six* [1998], *Rainbow Six 3: Raven Shield* [2005], etc.); Ion Storm (*Deus Ex: Invisible War* [2003], *Dark Project: Deadly Shadows* [2004]); and LucasArts (*Star Wars: Republic Commando* [2005], etc.).

Unreal Engine 3 took advantage of fully programmable shader hardware (artist friendly and programmer extensible, focused on DirectX 9). The per-pixel lighting and shadowing models were highly improved, and all rendering was done with 64-bit color HDR, according to Tim Sweeney. To compete with Crytek's CryEngine (famous for its use in *Far Cry* [2004] and *Crysis* [2007]), Epic pushed the Unreal Engine's capabilities toward the rendering of large outdoor expanses and a higher level of realism (real-time displacement-mapped procedural support for vegetation and normal-mapped and properly lit and shadowed terrain).

Unreal Engine 3 was mainly available for PlayStation 3, Xbox 360, and PCs (and, later, iOS and other consoles). Games using it included *Gears of War* (2006), *Bioshock* (2007), *Mass Effect* (2007), *Mirror's Edge* (2008), *Batman: Arkham Asylum* (2009), *Infinity Blade* (2010; iOS version), *BulletStorm* (2011), *Devil May Cry* (2013), and *Thief* (2014), among others. Starting in November 2009, users could download Unreal Engine 3 (called the Unreal Development Kit [UDK]) on the Epic Games website, available free and without limitation for noncommercial use. Unreal Engine 4, however, would take much longer to appear on the market; development of the source code began in 2003 with only one programmer, Tim Sweeney.

On March 19, 2014, at the Game Developers Conference (GDC), Epic Games released Unreal Engine 4 through a new licensing model with a monthly price of $19 as well as 5 percent of royalties. Since March 2, 2015, Unreal Engine 4 has been free to everyone, along with future updates. However, for commercial or for-profit creations, licensees must pay royalties. This opens a new realm for artists and independent studios who want to create new games, even with smaller teams.

Two years later, in 2016, at the GDC in San Francisco, Epic hosted a panel about its engine and its potential uses outside the gaming realm and made three big announcements. The first one included NASA speakers, who spoke about their use of the engine to build up a "real-world holodeck," to make Mars a virtual reality, and to create a fully functioning, perfect replica of the International Space Station (ISS) to help train astronauts in the intricacies of its systems and modules. The second announcement was by British carmaker McLaren Automotive, who used the Unreal Engine to help design and sell its high-end performance cars. Finally, the Walt Disney Company unveiled plans to use the engine to create a Star Wars–themed experience for its theme park (Star Wars: Galaxy's Edge, which opened in 2019). Also, the Unreal Engine is growing in importance in the production of both feature films and television shows, including live shows. More recently, Epic Games used the Unreal Engine for *Fortnite* (2017), a multiplayer survival game inspired by an internal game jam.

But sometimes projects do not go as expected. *Paragon,* a multiplayer online battle arena (MOBA) game, which was to use Unreal Engine 4, was announced in November 2015, and released March 18, 2016, but it was canceled April 26, 2018. Epic Games uploaded $17,000,000 of *Paragon* content for free to all Unreal Engine 4 developers/users who wanted to create personal projects: thirty-nine triple-A characters and over fifteen hundred environment components. All of this content is available for download inside the Unreal Engine Marketplace, a digital storefront where you can also get tutorials or purchase numerous assets.

The Unreal Engine community is made from hardcore triple-A developers but also numerous indie companies. An early version of a game like Studio Wildcard's *Ark: Survival Evolved* (2017) was built in less than nine months. At another level, Psyonix's *Rocket League* (2015, 2016, and November 2017 for the Nintendo Switch) had a short period to finalize a game mixing cars and soccer. Unreal Engine 4 is easily accessible and is usually preferred by artists instead of Unity because of its intuitive design and ease of use.

Released April 16, 2018, the Unreal Engine 4–powered Mars 2030 Editor brings tools used by the NASA Hybrid Reality Lab to live space simulations across forty square kilometers of open Martian terrain (available on Steam). The virtual reality (VR) experience is pushed a little bit further with that odyssey even if the pure gaming part is put aside. VR is becoming increasingly widespread within architectural design and real-time visualization, and the film industry is interested in the Unreal Engine as well. These venues and possibilities will push the engine to offer more updated powerful tools, technically and artistically.

In November 2018, the 4.21 version of the Unreal Engine became available. It included Nintendo Switch support for Niagara (the visual effects tool/plug-in replacing Cascade), improvements to the assets cooking process, and numerous general improvements in rendering, networking, scripting, VR, animation, and more.

Jean-Pierre Flayeux

See also: *Fortnite*; Game Engines; Virtual Reality

Further Reading

Bleszinski, Cliff. “History of the Unreal Engine.” IGN, February 23, 2010. Available at https://www.ign.com/articles/2010/02/23/history-of-the-unreal-engine.

Bott, Amanda. “Unreal Engine 4.21 Preview.” Accessed September 25, 2020. Available at https://forums.unrealengine.com/unreal-engine/announcements-and-releases/1537691-unreal-engine-4-21-preview.

Busby, Jason, Zak Parrish, and Joel Van Eenwyk. *Mastering Unreal Technology: The Art of Level Design*. Indianapolis, IN: Sams Publishing, 2005.

Busby, Jason, Zak Parrish, and Jeff Wilson. *Mastering Unreal Technology*. Vol. 1, *Introduction to Level Design with Unreal Engine 3*. Indianapolis, IN: Sams Publishing, 2009.

Busby, Jason, Zak Parrish, and Jeff Wilson. *Mastering Unreal Technology*. Vol. 2, *Advanced Level Design Concepts with Unreal Engine 3*. Indianapolis, IN: Sams Publishing, 2009.

Crecente, Brian. “Their Future Is Epic: The Evolution of a Gaming Giant.” Polygon. Accessed September 25, 2020. Available at https://www.polygon.com/a/epic-4-0.

Reinhart, Brandon. “Postmortem: Epic Games’ *Unreal Tournament*.” Gamasutra, June 9, 2000. Available at http://www.gamasutra.com/view/feature/3161/postmortem_epic_games_unreal_.php.

Unreal Engine. “A Real-Time Rendered Future: McLaren, NASA, Disney: GDC 2016, Event Coverage.” YouTube, March 24, 2016. Available at https://www.youtube.com/watch?v=_wKOTmcHI84.

“Unreal Engine 3.” *Maximum PC presents the Ultimate 3D Gaming Tech Guide* (Fall 2004): 59–64. Available at https://archive.org/details/Maximum_PC_Autumn_2004/page/n59.

Uruguay

To talk about the development of video games in Uruguay is to immediately recall excellent games such as *Fight'N Rage* (2019), one of the best beat-'em-up games available on Nintendo Switch, Xbox One, and PlayStation 4; educational games such as Trojan Chicken's *Special Investigations Unit* (2010) and *Ghostbusters Division*, a collaboration between Uruguay and Norway with the great ludologist Gonzalo Frasca; or Ironhide Game Studios' *Kingdom Rush* (2011), a video game with 89 percent positive reviews on Metacritic that was downloaded more than one hundred million times on iOS and was developed in seven languages: English, French, German, Japanese, Korean, Portuguese, and Russian.

The Uruguayan industry is very similar to Argentina's industry in terms of its origins and age; in Uruguay the development of video games has existed since 2002. This ecosystem was greatly favored due to the Ceibal Plan, a public policy around equity, learning, and technology. It was the first educational technology program based on the 1:1 model (one student with one computer) in Latin America, thus promoting inclusion and consolidating the integration of IT into education and learning processes.

Since 2011, the Ceibal Plan has focused on providing the educational community with a wide range of digital content for the improvement of teaching and learning processes through the development of learning management systems, educational platforms (e.g., in mathematics and English), and digital libraries, among other things, and it is from this that classrooms began to combine edutainment with ludology, taking advantage of the fact that video games are attractive because they are interactive, with adjustable difficulty; allowing students to interact as many times as necessary with a level; and adapting the knowledge of previous learning. This policy has benefited some software development companies, both for the development of applications for XO laptops and for video games in the same operating system.

Mega events are also a sign of the growing video game industry in Uruguay. Since 2015, the GameLab (Montevideo), an international format created in Barcelona, Spain, is also held in Shanghai and Tokyo. In Uruguay, this initiative is supported by GameLab, Uruguay XXI (through Uruguay Smart Services and Smart Talent); the Ministry of Industry, Energy and Mining (MIEM); the National Telecommunications Administration (ANTEL); the Chamber Developers of Videogames from Uruguay (CAVI); Ingenio; PROANIMA; and the Uruguayan Chamber of Information Technology (CUTI).

Because of that first version of GameLab, the CAVI creation was formalized as an organization that aggregates the country's industries, and in 2017, Level Up, an official CAVI event, was created in conjunction with MIEM, DINATEL, Uruguay XXI, and ANTEL and made its first appearance with the addition of an Uruguayan game showcase, where a call was made to all developers in the country, regardless of whether or not they participated in a government event.

Uruguay is a country with a growing demand for games. In 2010, the ORT University, in Montevideo, and the Faculty of Communication and Design pioneered the offering of a degree in animation and video games. Video game training covers areas such as animation, arts and digital media, video production, animation (2-D and 3-D), sound development, narrative, architecture, game design, characters and scenarios, programming technologies, virtual reality (VR) and augmented reality (AR), and marketing.

In 2018, digital literacy became mandatory in the schools in Uruguay and Argentina. The public policy focuses on capacity building on programming and robotics. It meets the following goals: to generate knowledge; to use technology (tablets) to fulfill educational interests; and to improve the software industry in the midterm. Despite this, the development of government computer platforms is very specific, so it is not attractive to all developers; however, there are more initiatives by the government that encourage support for video games.

As of 2019, there are twenty-two video game studios in Uruguay: ABYA, ARF Game Studio, BlitWorks, Curse Box Game Studio, EGG, Gecko Gecko Games, Golden Bite Games, the Good Guys, Ironhide, Kalio, Kef Sensei Studios, Light Arrow Games, Lisle Design, My Box, One Tango, Pincer Game Studio, Pomelo Games, Powerful Robot, Takion Studios, Trojan Chicken, Vainsencher, and WiseShards. Also, Etermax, from Argentina, runs a branch office in Uruguay.

Sandra Castro Pinzón

See also: Argentina; Brazil; Chile

Further Reading

Frasca, Gonzalo. "Uruguay." In *Video Games around the World,* edited by Mark J. P. Wolf, 609–612. Cambridge, MA: MIT Press, 2015.

V

VAPS. *See* Vintage Arcade Preservation Society

Vector Games

The era of vector arcade video games was a short one, beginning in 1977 and lasting less than a decade. Invented during the 1950s, vector graphics displays (also known as XY monitors) created their imagery differently from raster monitors, like those used in television sets. Whereas the electron beam covers the entire screen in raster-scan monitors, in vector-scan monitors, it only draws the line segments that make up the image and leaves the rest of the screen black. With less to draw, vector graphics could be displayed faster, with thinner, sharper lines that could be moved smoothly across the screen, as opposed to the solid, blocky graphics of raster games, for which movement was more difficult to program. Because objects were drawn individually, more moving objects were also possible, and even early vector games could have as many as forty independent objects, compared with only ten or so in raster games (Kent 2001, 130). The main disadvantage of vector graphics was that bitmaps were not available; everything was constructed from a series of line segments, so creating small, detailed graphics for game characters or objects was more difficult than it was in raster graphics. As a result, vector games tended to be less character based and mainly consisted of wireframe imagery on a black background.

Vector graphics came to the arcade when Larry Rosenthal, who had done a master's thesis on the mainframe game *Spacewar!* (1962) at MIT, developed vector technology that could be used in arcade games, which he called the Vectorbeam monitor. Rosenthal licensed his Vectorbeam equipment to the game company Cinematronics. After a dispute, Rosenthal left the company and created his own, which he also called Vectorbeam. Both companies produced games based on *Spacewar!*; Cinematronics' was called *Space Wars* (1977), and Vectorbeam's was called *Space War* (1977). (Rather than license technology from Vectorbeam, Cinematronics later bought the company in 1979.)

Cinematronics' next release was *Starhawk* (1978), which had visuals inspired by the Death Star trench scenes in the film *Star Wars* (1977). Vectorbeam's next game, *Speed Freak* (1978), was a driving game with a first-person perspective. *Speed Freak*'s oncoming cars were three dimensional, and they resized smoothly as they approached. When the player crashed into an oncoming car, it exploded into line segments that scattered across the scene, adding a more dynamic feeling of a crash and making *Speed Freak* the best driving game of its day.

In Atari's first vector game, *Lunar Lander* (1979), players tried to fly and land a spaceship without crashing it. That same year, Atari also released *Asteroids,* which became one of the best-known vector games, exceeding seventy thousand units produced, and arcade operators had to make larger coin boxes because the game was taking in so much money. Other games of the year included Cinematronics' *Sundance,* in which players opened panels in grids to catch bouncing suns; Vectorbeam's *Warrior,* in which two knights seen in overhead view engaged in a sword fight, one of the first one-on-one fighting games (along with SEGA's *Heavyweight Champ* [1976]); and *Tail Gunner,* a space shooting game that began development under Vectorbeam and finished at Cinematronics after it bought Vectorbeam. *Tail Gunner* was different in that its starfield movement was reversed; instead of flying into the depicted space like other games, the viewer was moving away from it, looking out the back of a spaceship at the ships chasing it—hence the name *Tail Gunner*. Exidy purchased the rights for a cockpit version of the game and released *Tail Gunner II* in 1980.

Other games of 1980 included Cinematronics' *Star Castle,* in which players fired at an enemy ship surrounded by rotating rings that could be destroyed; *Rip Off*, a tank shooting game in which pirate tanks are stealing the player's fuel canisters and hauling them off-screen; and *Armor Attack*, which featured jeeps, tanks, and helicopters from a bird's-eye view. Also released that year was Atari's *Battlezone,* probably the best-known vector arcade game of all time. *Battlezone* had a first-person perspective view and hardware that could do real three-dimensional computation.

Atari's *Red Baron* (1981) was essentially a flying version of *Battlezone* with biplanes, with rounds of shooting in the air as well as from the ground. Another Atari vector game of 1981 was the arcade classic *Tempest*, an abstract game that involved shapes moving up a well that the player had to shoot at and stop before they got to the top, an idea that began as a first-person version of *Space Invaders* (1978; Kent 2001, 164). The scaling imagery used in *Tempest* was easy for vector graphics and was something that could not be done well in raster games. Vector games made good use of scaling and quick, smooth movement, and around 1981, they began to appear in color, including *Tempest*. Games before 1981 were typically either black and white or monochrome (e.g., *Battlezone* had green lines on a black background). Some games, such as *Star Castle*, had color overlays on the screen to make the game's lines appear to be different colors, but the monitors themselves were not color.

SEGA released two vector games in 1981, *Eliminator* and *Space Fury*. Like *Star Castle*, *Eliminator* had its enemy spaceship situated inside a circular enclosure, although *Eliminator*'s enclosure had a narrow tunnel that the player could try to shoot down to destroy the enemy ship. *Eliminator* was released in a one-player upright version, a two-player cocktail version, and a four-player version, making it the only four-player vector game ever made. *Space Fury* was another space shooting game, known mainly for its attract mode; it featured a one-eyed alien commander that taunted players in synthesized speech. Other games of 1981 were variations of shooting games, including Cinematronics' *Boxing Bugs* and *Solar Quest* and Midway's *Omega Race*.

The year 1982 was another big one for vector gaming, with at least six new arcade games appearing along with the only vector home console system. Three arcade games were from Atari: *Space Duel*, *Gravitar*, and *Quantum*. *Space Duel* was

Atari's only vector game that two players could play simultaneously and was similar to *Asteroids* but with three-dimensional color asteroids and either competitive or cooperative gameplay. *Gravitar* combined skills from *Asteroids* and *Lunar Lander* and was made up of four "universes" (with gravity that was either negative or positive and landscapes that were either visible or invisible). Each universe had three solar systems, each solar system had four or five planets, and each planet had its own unique terrain to navigate, giving players several dozen screens to see. *Quantum*, inspired by particle physics, was an abstract game in which players used a trackball controller to encircle particles (capturing them) while avoiding hitting other particles.

SEGA also had three new vector games in 1982: *Zektor*, *Tac/Scan*, and *Star Trek*. *Zektor* involved freeing eight cities from waves of attacking enemy fighters and "roboprobes." *Tac/Scan* was a three-stage space shooting game in which the player controlled a squadron of seven ships that all flew in formation and moved as one. A unique feature of the game was its change in perspective. *Tac/Scan*'s first stage was two dimensional and similar to games such as *Galaxian* and *Space Invaders*, but its second stage was three dimensional, with players firing into the screen instead of up or down the screen. SEGA's *Star Trek* had five controls to learn, six enemies, and forty simulation levels of play, making it one of the most elaborate vector games ever made (along with possibly *Gravitar*).

The GCE/Milton Bradley Vectrex, the only home game system with vector graphics, was released in 1982. Because television sets used raster graphics, the Vectrex came with its own vector monitor. The screen was monochrome, and colored overlays were used to color the games' graphics. Games released for the Vectrex included original games (*Bedlam*, *Blitz!*, *Fortress of Narzod*, *Minestorm*, *Hyperchase*, and others), adaptations of Cinematronics' vector arcade games (*Space Wars*, *Starhawk*, *Star Castle*, *Armor Attack*, *Rip Off*, *Solar Quest*, and *Cosmic Chasm*), adaptations of raster arcade games (*Berzerk*, *Pole Position*, and *Scramble*), games that used a light pen (*AnimAction*, *Art Master*, and *Melody Master*), and even some 3-D games (*3D Crazy Coaster*, *3D MineStorm*, and *3D Narrow Escape*), which involved an additional special 3-D viewer. Since the system has ceased production, Smith Engineering has allowed Vectrex materials to be copied for noncommercial purposes, allowing a community of Vectrex fans to continue creating homebrew games for the Vectrex.

A few more vector games appeared in 1983: GCE/Cinematronics' *Cosmic Chasm*, Centauri's *Aztarac*, and Atari's *Black Widow*, *Major Havoc*, and *Star Wars*. In *Cosmic Chasm*, the player had to fly through tubes inside a space station to fire at its core and then fly out again before it blew up. *Aztarac*, another space game, had players defending a starbase from attacking ships. In *Black Widow*, players controlled a spider on a spider web that it defended from invading bugs by shooting at them. *Major Havoc* was a detailed multistage adventure game that involved shooting enemy ships, landing in a space station, and navigating a scrolling maze of hallways with a variety of objects (such as robot guards and electrified barriers) that the player passed through on the way to destroying the station's reactor. Finally, the best-known vector game of 1983 was Atari's *Star Wars*, a colorful, three-dimensional take on the space battles and Death Star trench chase scenes from the film, and it even included digitized voice samples from the film's soundtrack.

The year 1983 was the last year Cinematronics produced vector games. That same year, it released its first laserdisc game, and its success redirected the company's efforts in the new technology. No company appears to have released vector arcade games in 1984, although work on a few games continued. In 1985, another *Star Wars*–based game, *The Empire Strikes Back*, was released by Atari Games, and it was the last major vector game released. (Only one other game may have been produced that year, Exidy's space game *Vertigo* [1985].) Probably the last vector arcade game ever made, which may or may not have been released, is Exidy's *Top Gunner* (1986), a sit-in game that is said to be a modification to *Vertigo*.

By the late 1980s, sprite technology had improved greatly, and three-dimensional filled-polygon graphics were beginning to return to the arcade after their failed debut in Atari's *I, Robot* (1984). Raster games had improved graphically, the rise of three-dimensional raster graphics games in the 1990s was just around the corner, and the era of vector games was over. However, the unique look and playing experience of vector games has attracted a following, and vector games live on as arcade collectibles and in adaptations for emulators. They are remembered as an important part of the golden age of arcade video games.

Mark J. P. Wolf

See also: Arcade Games; Cinematronics; GCE/Milton Bradley Vectrex; Vectorbeam

Further Reading

Kent, Steven L. *The Ultimate History of Video Games: The Story behind the Craze That Touched Our Lives and Changed the World*. New York: Three Rivers Press, 2001.

Wolf, Mark J. P. "Vector Games." In *The Video Game Explosion: A History from PONG to PlayStation and Beyond*, edited by Mark J. P. Wolf, 67–71. Westport, CT: Greenwood Press, 2007.

Vectorbeam

Larry Rosenthal's company Vectorbeam was the first company devoted to the production of vector games, which used vector graphics instead of raster graphics and thus could provide games with sharp wireframe graphics and smooth motion that was new to the arcade.

In the late fall of 1976, Larry Rosenthal, a graduate of MIT, along with his business associate, Bill Cravens, set up shop in Union City, California, to begin a business venture based on Rosenthal's video game success, *Space War* (1977). Before this endeavor, both men had been employed by the struggling video game company Cinematronics, with Cravens as the company's sales representative. Cinematronics was a small company located in an industrial strip mall in El Cajon, California, struggling to get by with whatever video games it could acquire and manufacture and already beginning to feel what was to come, an almost assured bankruptcy.

After graduating from MIT, Larry Rosenthal acquired the rights to build and sell his own commercial version of MIT's laboratory pastime *Spacewar!* (1962) and turned it into a coin-operated (or coin-op) game that he called *Space Wars* (1977). His obsession with the game began in 1973, and by 1976, he was ready to put a prototype in a friend's arcade. When he returned from a short trip, Rosenthal found that *Space Wars* had taken in more than $500 in six days, evidence that his obsession with vector displays could pay off. His next challenge was to manufacture and market the game. Rosenthal took his prototype to every established video game manufacturer that he could find, hoping one would agree to his demand for a fifty-fifty split of the revenues from the game.

Larry's faith in *Space Wars* (1977) may have appeared hubristic, but he was one of the few persons who had seen and played the original game at MIT. In an era when computer graphics were blocky and slow to refresh, vector graphics were lightning fast, faster than the flicker fusion rate, the frame rate at which sequences of moving images combine to present the illusion of continuousness. However, even with innovative features such as multiplayer gameplay, unlimited buy-in, and the allure of the game's smooth vector graphics, *Space Wars* was hard to sell to manufacturers. Even though the game was testing well, no game company was willing to split revenues with Rosenthal, except for one small, desperate company, Cinematronics. In this case, desperation became a bonanza for Cinematronics. *Space Wars* was the hit of the 1977 AMOA show and went on to sell at least ten thousand, units with some sources putting the figure at three times that. Sales records of *Space Wars* put it at number one for almost two years.

With statistics like these, it was inevitable that salesman Cravens would find a way to exploit the *Space Wars* bonanza. Rosenthal was the owner of all rights to his game, complete with patents, and his share of the revenues had become substantial thanks to the two-way split with Cinematronics. Regardless of the damage that would be done to that company, it made sense for Rosenthal and Cravens to found their own video game company, Vectorbeam. Their company did not last long, perhaps only from September 1978 to August 1980, as recorded by Vectorbeam programmer and game designer Dan Sunday. Even so, the games created there were innovative and fun to play, exploiting Rosenthal's mastery of vector graphics. The company bootstrapped itself by manufacturing its own clone of *Space Wars*, now slightly renamed as *Space War* (1977). Another slight, but significant, difference was the quality of the two company's game cabinets. Unlike the Cinematronics cabinets, which were prone to fall apart in shipment, Vectorbeam's cabinets were more solid. This was nothing significant to the players of the game, but it was a touch that helped determine which of the two versions would most likely be purchased by vendors.

The first original game from Vectorbeam was *Scramble* (1978), which is not to be confused with the later 1981 video game of the same name. Few ever played or even saw *Scramble*, an unusual and somewhat difficult-to-play vector version of a pinball game. Without the bells and flashing lights that a pinball machine offered and a playfield made up of squared-off white lines on a black background, *Scramble* had no chance of matching the fun and excitement of a tangible pinball game. Even so, Vectorbeam managed to sell enough units to keep its new company alive. Vectorbeam programmer Dan Sunday remembers, "It was the very first game for Vectorbeam. So, when the company first started things, it was really hectic, a scramble. We were trying to get our new business off the ground and get a game to the annual AMOA show in Chicago. We managed to quickly put together the video pinball game *Scramble* and actually got it there in time for the trade show."

Next would be a landmark driving game, Larry Rosenthal's *Speed Freak* (1978). Unlike most driving games at the time, *Speed Freak* took advantage of vector graphics to display geometrically true wireframe depictions of oncoming cars, twisting roads, and various other obstacles and scenic embellishments. To optimize the number of lines that had to be scanned across the vector display tube, Rosenthal placed most objects on only one plane, x, y, or z. This established the true three-dimensional quality of the game without squandering precious computation and line-drawing time.

Rosenthal did, however, include one stunning animation that used all three dimensions. The biggest thrill in *Speed Freak* was rewarded not for staying on the road but for crashing the player's car in a head-on collision. To do that, Rosenthal used all three axes to create the first true three-dimensional explosion in a video game. Because of the computation time required to rotate objects on all three axes, Rosenthal and Sunday chose to display a pre-rendered animation of pieces of the player's car tumbling away. Even though the explosion was not interactive, it was still a landmark in video game graphics. Because of the popularity of seeing this explosion during tests, players were allowed to crash the car without penalty until their time ran out, if they chose to do so. Many did, but most eventually went back to avoiding collisions so as to get a high score. It was customary for rival companies to play the games of other companies, and back at Cinematronics, playing *Speed Freak* became a favorite pastime.

Even though Cinematronics could still manufacture games based on Rosenthal's hardware, Vectorbeam could still become a powerful rival. Worse for Cinematronics, the El Cajon–based company still had to pay royalties to Rosenthal for every game that used his technology, which, of course, was the only technology Cinematronics had at that time. It became obvious that Cinematronics' best solution was to buy Vectorbeam outright. As it turned out, *Speed Freak* did well, but Rosenthal's company was still struggling. To keep product moving on the assembly line, Bill Cravens purchased a game from Cinematronics that had only been a training exercise for novice programmer Rob Patton. At various times, it was known as *Blitz* or *Barrier* (1978), and it was never popular. In the end, Cinematronics bought Vectorbeam for $2 million and removed its primary competitor, receiving the patents to the technology as well. This enabled the Cinematronics executives to pay themselves all related royalties, funds that would have otherwise gone to Rosenthal as part of his original agreement—not an insignificant amount.

One new Vectorbeam game, almost finished at the time of the takeover, was *Tail Gunner* (1979). This game did quite well and was eventually licensed to another manufacturer who wanted to build a sit-down version of the game. The name *Tail Gunner* was suggested by Vectorbeam's new top executive, Tommy Stroud, the son of Cinematronics co-owner "Papa Tom" Stroud. Tommy felt that reversing the movement of the animated star field gave a greater sense of urgency to the game. He reasoned that a retreating position created greater anxiety in the player, heightening the thrill of the game. *Tail Gunner* appeared to be a certain success, but the game's joysticks had a fatal flaw. At first, the sticks appeared to be ideal; they were small, rugged, and not too expensive. What remained unforeseen was that the joysticks soon stopped working after a certain number of movements. That was acceptable for their original purposes, but they were nowhere near good enough for video games. Changes were made, but the damage was done as far as vendors were concerned. Later, in 1980, the game company Exidy licensed and sold *Tail Gunner* as *Tail Gunner II* (1980), a cockpit version using joysticks that did not have the earlier problem.

For a short time after Cinematronics' buyout of Vectorbeam, the company name became Vectorbeam, a Cinematronics Company. Release dates determined which manufacturing facility would build a particular game, regardless of where it had been developed. For instance, the Cinematronics game *Warrior* (1979) was conceived and programmed in El Cajon but was manufactured and sold from the Vectorbeam facility. The reverse was true for *Tail Gunner*, which was conceived at Vectorbeam but built and shipped from Cinematronics. This was temporary. Once Cinematronics had taken inventory, El Cajon once again became Cinematronics' only base of operations, and Vectorbeam was no more.

The last game to be associated with Vectorbeam was *Star Castle* (1980), a successful title that was a collaboration of rivals. When Cinematronics purchased Vectorbeam, Cinematronics took inventory of its rival's assets. One particular title revealed to Cinematronics was the strangely named *Oops!*; Larry Rosenthal had begun working on this game, which originally had a birth control theme. Vectorbeam programmer Dan Sunday describes the origin of this oddity:

> Yes, *OOPS* existed. Part of its inspiration was that Larry was obsessed with a very attractive young lady who was playing around with him (maybe trying to dump him, but that only made Larry more obsessive about her). Anyway, he sometimes seemed more concerned about winning her than making Vectorbeam work. *OOPS* came out of this obsession. Larry had dreamed up this game where an egg was in the center of the screen, and sperm were coming on from all directions. One player controlled the sperm, and turning left caused them all to turn left, so the other player didn't really know which one you were steering. The other flew a syringe around which, when fired, would send out foam that killed the sperm. Initial tests indicated that the syringe almost always won. So, we fixed the syringe in the center of the egg and allowed the player to only rotate it.

When the delegation from Cinematronics reviewed the game that Vectorbeam had been developing, it was clear that it had potential. However, it was still a long way from being a testable title. *Star Castle* was a hit title for Cinematronics, but primarily because of the ingenuity and development design skills of Scott Boden, the programmer of the game as released.

Tim Skelly

See also: Arcade Games; Cinematronics; Vector Games

Further Reading

Skelly, Tim. "The Rise and Fall of Cinematronics." In *Before the Crash: Early Video Game History*, edited by Mark J. P. Wolf, 138–167. Detroit, MI: Wayne State

University Press, 2012.

Vectrex. *See* GCE/Milton Bradley Vectrex

Video Arcade Preservation Society. *See* Vintage Arcade Preservation Society

Video Game Literacy

Video game literacy is the ability to decode, understand, and create meanings through video games, and it also includes the learning experiences that result from digital play. The notion of video game literacy suggests that the video game is a medium distinct enough to have its own characteristic form of literacy. It also implies that players have to learn a new set of practices to access and communicate knowledge in the medium in which it is generated and transmitted, in this case, video games.

Throughout their history, humans have developed different technologies that help them think and acquire knowledge in different ways. The extensive influence technology exerts on human cognition can be seen throughout the major epistemological and technological revolutions in human history: the transition from orality to literacy, a central topic researched by Walter Ong and Eric Havelock, and the advent of electronic media, followed by the rise of the digital technologies, studied by Marshall McLuhan, Lev Manovich, and Katherine Hayles. The introduction of literacy signaled a profound shift in thought processes and the development of new cognitive abilities. Ong (2002) argues that the transition from orality to literacy, an intricate and lengthy process, enabled a change in human cognition that allowed the creation of science and rational discourse, for written texts prompted the development of analytical thought and rational discussion.

The advent of electronic and new media caused a paradigm shift in the way humans think and transmit ideas, changing their conceptions of knowledge and introducing a vast range of new artifacts, such as film or radio, which helped them learn and interact with the world in novel ways. The computer proved to be the most powerful artifact of the latest technological and epistemological revolution, for it became an essential tool to access and transmit knowledge, and it brought about the development of new cognitive abilities, generally known as *digital literacy*. Video games played a crucial role in the development of this digital literacy, as they were among the first applications that allowed computers to be used in creative, original ways. Even in the early days of video games, researchers such as Alan Kay saw the huge potential of this medium to generate and communicate ideas and knowledge, and video games gradually introduced their own distinctive form of literacy.

Kay was the head of Atari's research center at the beginning of the 1980s, and was among the first to announce the emergence of an entirely new, innovative medium that would be fundamentally different from all previous media, for it would offer new ways to represent, communicate, and animate thoughts, dreams, and fantasies through compelling worlds, images, and sounds. He suggested that video games were “a dynamic medium for creative thought” (Rheingold 1985), a thought-provoking activity that would stimulate players’ minds in playful digital environments. He worked toward the development of grand interactive experiences that would allow players to explore digital worlds and be the main characters in their own epic adventures. Video games were on their way to becoming much more than a novel application of newly developed computing power.

Video games can be studied as participatory experiences that allow players to learn through simulations, where different scenarios can be safely explored. James Paul Gee, Kurt Squire, and José P. Zagal have done extensive research on how digital environments offer learning experiences based on discovery activities, immediate response to players’ actions, and significant knowledge applied in a meaningful context. Video games allow players to thoroughly analyze a problem or an obstacle and immediately test their strategies to overcome these difficulties in a virtual world that provides instant feedback. Therefore, players have to constantly refine their approaches using the information provided by the digital environment.

James Paul Gee states that video games provide simulations that allow the development of situated understanding. Video games offer learning experiences based on discovery activities, immediate response to players’ actions, and significant knowledge applied in a meaningful context. Gee proposes a model called the Probe, Hypothesize, Reprobe, Rethink cycle (Gee 2003, 90) to exemplify how players interact with digital environments. First, players probe and explore the virtual world of the video game, which involves looking around the map and clicking on the different parts of the environment. They then encounter a problematic situation. After careful reflection, they formulate a hypothesis about what actions or objects might be used to solve this problem. Then, they carry out strategies to overcome obstacles and complete objectives. They reprobe the digital world and test their hypotheses to see the effects they get. Players analyze feedback given by the digital game, which can either be a successful endeavor or a complete failure. They adapt their hypotheses with the information provided by the game, and they rethink the steps needed to overcome obstacles. This model is remarkably similar to the way scientists approach problems using the scientific method (Morris et al. 2013).

Kurt Squire defines *video game literacy* as “developing expertise in designing rewarding experiences for oneself within a gameworld (particularly within the game’s semiotic and rule systems)” (Squire 2008, 643–644). Different meanings are created and analyzed through the activity of digital play. Squire analyzes the different dimensions of games to understand how they foster literacy. Video games are spaces for action, where players have agency in unfolding events in the game and changing the symbols and representations within the game world. Therefore, video games are dynamic systems that respond to players’ actions. Games are a performing act, where players are actively engaged not only in the production of meanings but also in the execution of actions in these digital environments. Knowing and doing are two stages of learning that are closely intertwined in the activity of digital play. Consequently, video games foster a functional epistemology, where players learn by doing, through performance (Squire 2008). Players go through recursive cycles of perception and action, thinking and doing, within game worlds.

José P. Zagal explores how players critically engage with video games. He uses the term *ludoliteracy* to describe the particular type of literacy that arises from playing games. Zagal defines *ludoliteracy* as the ability to play games, the ability to understand meanings with respect to games, and the ability to make games (Zagal 2010, 23). Playing games is the first step in this kind of literacy, as learning to read and write would be in traditional literacy. Second, players analyze and think critically about the games they play. Zagal considers that the understanding of games is the "ability to explain, discuss, describe, frame, situate, interpret, and/or position games: (1) in the context of human culture (games as a cultural artifacts), (2) in the context of other games (comparing games to other games, genres), (3) in the context of the technological platform on which they are executed, and (4) by deconstructing them and understanding their components, how they interact, and how they facilitate certain experiences in players" (Zagal 2010, 24). Each one of these contexts explores the different facets of video game analysis that will provide a thorough understanding of the gaming experience, which, according to Zagal, culminates in players contributing with their own video games.

Video games are valuable tools for generating knowledge because they enhance players' cognitive abilities through virtual worlds where they can enact different roles and actively experience different situations and problems, not just imagine what being in a particular situation would be like. Players exercise problem-solving skills and abstract thinking through simulations and ongoing participation. To play any video game is a cognitive exercise that ineluctably influences the way players think and learn.

Rita Santoyo Venegas

See also: Reading Video Game Imagery

Further Reading

Gee, James Paul. "Deep Learning Properties of Good Digital Games: How Far Can They Go?" In *Serious Games: Mechanisms and Effects*, edited by Ute Ritterfeld, Michael Cody, and Peter Vorderer, 67–82. New York: Routledge, 2009.

Gee, James Paul. *What Video Games Have to Teach Us about Learning and Literacy*. New York: Palgrave Macmillan, 2003.

Havelock, Eric A. "The Alphabetic Mind: A Gift of Greece to the Modern World." *Oral Tradition* 1, no. 1 (1986): 134–150.

Hayles, N. Katherine. *How We Think: Digital Media and Contemporary Technogenesis*. Chicago: University of Chicago Press, 2012.

Manovich, Lev. *The Language of New Media*. Cambridge, MA: MIT Press, 2002.

McLuhan, Marshall. *Understanding Media: The Extensions of Man*. Cambridge, MA: MIT Press, 1964.

Morris, Bradley, Steve Croker, Corinne Zimmerman, Devin Gill, and Connie Romig. "Gaming Science: The 'Gamification' of Scientific Thinking." *Frontiers in*

Psychology 4, no. 607 (2013): 1–16.

Ong, Walter. *Orality and Literacy: The Technologizing of the Word*. New York: Routledge, 2002.

Rheingold, Howard. *Mind Amplifier: Can Our Digital Tools Make Us Smarter?* n.p.: TED Conferences, 2012.

Rheingold, Howard. *Tools for Thought: The History and Future of Mind-Expanding Technology*. Tools for Thought, 1985. Available at http://www.rheingold.com/texts/tft/.

Shaffer, David Williamson, Richard Halverson, Kurt Squire, and James Paul Gee. "Video Games and the Future of Learning." Wisconsin Center for Education Research (NJ1), 2005.

Squire, Kurt. "Toward a Media Literacy for Games." *Telemedium* 52, nos. 1–2 (2005): 9–15.

Squire, Kurt. "Video Games in Education." *International Journal of Intelligent Games & Simulation* 2, no. 1 (2003): 49–62.

Squire, Kurt. "Video-Game Literacy: A Literacy of Expertise." In *Handbook of Research on New Literacies*, edited by Julie Coiro, Michele Knobel, Colin Lankshear, and Donald J. Leu, 635–670. New York: Routledge, 2008.

Zagal, José P. *Ludoliteracy: Defining, Understanding, and Supporting Games Education*. Pittsburgh, PA: ETC Press, 2010.

Zimmerman, Eric. "Gaming Literacy: Game Design as a Model for Literacy in the 21st Century." In *The Video Game Theory Reader 2*, edited by Bernard Perron and Mark J. P. Wolf, 23–31. New York: Routledge, 2008.

Video Game Movies

Over the years, video game movies have been met with mixed reception from critics and fans of the franchises. These adaptations often receive a lukewarm reception before they have even been released. However, some video game movies have exceeded initial expectations with blockbuster budgets and A-list casts, such as *Lara Croft: Tomb Raider* (2001), the first of two movies starring Angelina Jolie as Lara Croft. Even video games themselves, mostly produced by triple-A studios, have become increasingly more reliant on filmic special effects, cinematography, and all-star casts.

However, big budgets and high-profile celebrities do not always result in successful movie adaptations of video games. Success, by Hollywood standards, is often measured by box office take as well as critical response. *Lara Croft: Tomb Raider* (2001), for example, had a budget of $94 million and a box office take of $274.7 million and was seen as a relative success. Whereas *Silent Hill: Revelation* (2012), starring Kit Harington, had a budget of $20 million and generated $56 million at the box office. Both received mixed reviews, but, fiscally, one was more successful than the other.

This is not to say that all video game movies have been a commercial failure. Even poorly reviewed films such as *Street Fighter* (1994) and *Pokémon the First Movie* (1999) made their production budgets back at the box office several times over. *Warcraft* (2016) is currently the highest-earning video game movie, with box office earnings of $439 million, yet analysts believe it could still lose money based on the large production and marketing budget. Short films have also had some degree of success in the field of video game adaptations. Without the pressures of needing to be a box office hit, short films can be produced by passionate amateurs who stay closer to the spirit of the game. The 2018 short film for *Papers, Please* (2013) was praised for its authenticity to the game and has overwhelmingly positive reviews. The game's creator, Lucas Pope, not only agreed to the making of the short film but also shared his approval of the final version. Some unofficial short video game movies have also been produced by dedicated fans, with varying degrees of quality and success. *Uncharted: Live Action Fan Film* (2018) is one such example of a high-quality fan film, starring Nathan Fillion as Nathan Drake, that was widely praised for its authenticity and closeness to the source material.

Researchers have highlighted a multitude of reasons for the variance of quality in movie adaptations of video games. For one, these movies are being marketed to and received by split audiences: those who have played the game, and those who have not. This split audience will likely also contain fans of particular genres, bringing other conventional expectations to the movie. Fans of the video game will scrutinize the authenticity of the details and how the video game is represented in film, whereas the general moviegoer will critique it as a successful narrative rather than as a remediation of a video game. They may recognize elements of the movie that are linked to the video game, but this will not necessarily be of importance to their enjoyment. For fans, it is the representation of the game world, rather than the core narrative, that matters when the game world is extended. When a movie adaptation misses the mark, it alienates the video game fanbase, resulting in the movie not succeeding as expected.

Additionally, some genres are more readily ported over to the silver screen. Popular survival horror game franchises *Silent Hill* (2006) and *Resident Evil* (2002) have been made into movies, with relative success. Horror games remediate conventions of the horror film genre through mechanics to simulate the same fear and anxiety induced in audiences watching a typical horror film. Here, expectations of the genre are met, and tropes are replicated. Therefore, remediating horror games into films works well and achieves the desired style without running into issues that other productions face.

A key element of horror games is the removal of agency. One of the main discrepancies with adapting a game to a movie is situating the player into the position of audience, thus removing his or her control over the game world. As horror games have moments where player agency is removed, and this adheres to the conventions of the horror genre, it does not produce a jarring outcome but rather a harmonious blend of the two media.

Some adaptations have deviated entirely from the source material, whereas others adhere closely to the traits of the video game—sometimes too closely. *Super Mario Bros.* (1993) is considered to be the first official video game movie adaptation. Starring Bob Hoskins and John Leguizamo as the titular Mario brothers, the movie stepped away from the 8-bit style and narrative of the classic Mario games and instead used special effects and live action. While the visual effects were impressive, the movie only drew $20.9 million at the box office, despite a $48 million budget. Similarly, the *Resident Evil* film series contains a character called Alice (played by Milla Jovovich) who was created specifically for the movie adaptation. After the first *Resident Evil* (2002) film, the following installments are in no way linked to the subsequent narrative in later game releases, including titles such as *Resident Evil: Apocalypse* (2004) and *Resident Evil: Retribution* (2012). Conversely, *DOOM* (2005) uses a first-person perspective sequence in an attempt to emulate the first-person shooter (FPS) camera found in the *DOOM* series. The segment in question only lasts five minutes and sees the camera "enter" Sgt. John Grimm's view as he goes on a shooting frenzy, directly translating the typical player view to the cinema screen.

A notorious individual attached to video game movies is the now retired director Uwe Boll. Boll is most known for directing, and often also financing, movies loosely based on video games. *In the Name of the King: A Dungeon Siege Tale* (2007) was Boll's most expensive production at $60 million. Unfortunately, it was not received well critically and only generated $13.1 million at the box office. This became a trend with Boll's later video game movies, including *Alone in the Dark* (2005), *Postal* (2007), and *Far Cry* (2008).

Alongside adaptations are movies with video games as the focal point of the story, such as in *Tron* (1982). In *The Last Starfighter* (1984), Alex is the top scorer on the *Starfighter* arcade game. Upon discovering this, the creator of the game meets and abducts Alex, enlisting him into an intergalactic war, identical to that of the arcade game. This retro arcade nostalgia was reignited in *Pixels* (2015). Aliens receive video game feeds and interpret them as declarations of war; they then invade Earth in the form of classic arcade characters, such as Pac-Man. To save the world, the U.S. Army enlists top-ranking arcade players. More recently, *Ready Player One* (2018) combined a large number of IPs (intellectual properties) from popular video games, such as *Overwatch* (2016) and *World of Warcraft* (2004), as part of the OASIS—a virtual world where individuals can do anything and everything. The film follows a great quest to find three keys embedded in the creator's games and riddles to become the sole owner of the program and, as a result, extremely wealthy.

Some video game developers have created their own film studios. Square (now Square Enix) founded Square Pictures in 1997, intending for it to aid the company in merging CGI from film into its games. In 2001, Square Pictures released *Final Fantasy: The Spirits Within*, which had a production budget of $137 million and earned a box office take of $85.1 million. The reviews were negative, as fans felt the movie departed from what was near and dear to the franchise, and the movie itself did not deliver an action-packed experience but rather a more experimental and visual one. Square Pictures is now a subsidiary of Square Enix.

Current movie distribution methods such as streaming services, instead of DVD/Blu-Ray sales, have aided the success of more recent video game movie releases. *Tomb Raider* (2018) stars Alicia Vikander as Lara Croft in a new origin story based on the rebooted game franchise from Square Enix. The subject of mixed reviews, with an estimated budget of $106 million and a box office take of $274.7 million, *Tomb Raider* had the distinct advantage of making profits by selling to streaming services such as Netflix and HBO, unlike previous video game movies.

As of early 2019, there are currently as many as forty video game movies currently stated to be in production. However, video game movies are notorious for getting stuck in "production hell," where they are confirmed to be in production but are unable to be made for many years. Video game movies may never be received with open arms if the audience's expectations are divided from the start, but there is a clear trend toward their performing better than they used to at box office. For video game fans, they can provide more of the world they love, and for moviegoers, they provide an awe-inspiring spectacle experience without having to hold the controller.

Courtney Blamey and Rhys Jones

See also: Representations of Video Games in Hollywood Cinema

Further Reading

Bolter, J. D., and R. Grusin. *Remediation: Understanding New Media*. Cambridge, MA: MIT Press, 1999.

Elkington, T. "Too Many Cooks: Media Convergence and Self-Defeating Adaptations." In *The Video Game Theory Reader 2*, edited by Bernard Perron and Mark J. P. Wolf, 213–236. New York: Routledge, 2008.

"47 Video Game Movies Ranked Worst to Best." Rotten Tomatoes. Accessed October 3, 2020. Available at https://editorial.rottentomatoes.com/guide/video-game-movies-ranked-worst-to-best/.

Kaklamanidou, B., and M. Katsaridou. "Silent Hill: Adapting a Video Game." *Literature/Film Quarterly* 41 (2013): 266–277.

Meikle, K. *Adaptations in the Franchise Era: 2001–16*. London: Bloomsbury Academic, 2019.

Owen, L., and P. Anderson. *Lights, Camera, Game Over! How Video Game Movies Get Made*. Atglen, PA: Schiffer Publishing, 2017.

Papazian, G., and J. M. Sommers, eds. *Game On, Hollywood! Essays on the Intersection of Video Games and Cinema*. Jefferson, NC: McFarland & Company, Inc., 2013.

Perron, Bernard. "Survival Terror." In *Silent Hill: The Terror Engine*, 10–32. Ann Arbor: University of Michigan Press, 2012. Available at https://doi.org/10.2307/j.ctv65swb6.5.

Video Game Museums

Video game museums are a global phenomenon that reflect society's growing interest in the history and entertainment of classic video games and in nostalgia in general. While some video game preservation efforts have come and gone in recent decades, their net numbers continue to grow. These museums prove enchanting to diverse audiences while also preserving history and conducting new and ever-expanding research in this important field.

While classic arcade museums and exhibitions date back at least to the 1930s (then celebrating older machines from the rise of the coin-operated floor model amusement machine in the 1880s), video game museum efforts began in the 1990s. The growth of these efforts has accelerated. Over two-thirds of the museums listed here were established after 2010, with the majority of them created between 2014 and 2019. Of the museums established earlier, most have experienced the bulk of their development and video game accomplishments during this same decade.

A video game exhibition at the Musee des Civilisations in Quebec City, Quebec, Canada. (Martial Genest/Dreamstime.com)

Although most museums were started by a single person or a group of friends, many have begun successfully evolving down the path of developing a wider breadth of community support. They range from spaces barely over one thousand square feet at the back of retail store in Australia, to large, financially well-endowed institutions such as the Strong Museum of Play. Some have received extensive governmental funding, especially in Europe, while others have received none. At least three have raised funds on crowdfunding sites. Some of these museums are solely focused on video games in general or in specific subsets such as console gaming. Others see their video game efforts as subsets of larger fields of interest, such as computing, play, or pop culture. One area in which they vary the most visibly is in their respective focuses on interactive play versus traditional “Don’t Touch” offerings. Some primarily present extensive historical displays and research programs, and a few are not much more than play-oriented retro arcades with “museum” in their name. Most offer some combination of both.

The German Computerspielemuseum Berlin (http://computerspielemuseum.de/) began as a permanent exhibit from 1997 to 2000. It then became an online only museum until 2011, at which time it reopened a physical presence with the help of government funding. It features highly visited curated exhibits and holds one of the largest collections of entertainment software, hardware, and technical hardware in Europe.

Nagasaki, Japan, brings us the Game Museum at the Huis Ten Bosch theme park. Like many of these museums, it balances play opportunities with exhibits. Numerous cleanly designed static displays contain console machines from the Magnavox Odyssey to today's releases. Surrounding these exhibits are numerous playable coin-operated machines and other games interspersed with roped-off arcade machines dating back to *Computer Space* (1971). It is also one of multiple Japanese locations to feature *Space Invaders Gigamax*, a video game for twenty simultaneous players with a screen 174 feet (53 meters) long and 36 feet (11 meters) high. It opened in 2014 (http://english.huistenbosch.co.jp).

The Museum of Soviet Arcade Machines is a private, historical arcade museum with interactive collections of video game and electromechanical game machines made from the mid to late 1970s up through the fall of the Soviet Union in 1992. With the breakup of the USSR, domestic coin-op video manufacturing found itself without subsidy nor the ability to compete commercially and quickly ceased to exist. While some of these Soviet coin-operated video games are local inspirations, a good number were copies (sometimes exact) of American arcade video games made circa 1975. All have local charm, many have military and industrial manufacturing lineage, and some have historically unique features, such as nixie tube scoring displays. All their machines are playable, and all are accompanied by informational signage. The Museum of Soviet Arcade Machines was founded in Moscow, Russia, in 2007, and a St. Petersburg branch was added in 2013 (http://www.15kop.ru/en/).

In Los Angeles, California, the Museum of the Game (MOG) is the fruition of multiple game enthusiast efforts that began in the 1980s. Its live entertainment and exhibition Arcadia branch opened in 1982 in the United Kingdom and was acquired and relocated to the United States in 2003. Arcadia presents visitor-playable and nonplayable arcade, console, and computer video game history. These exhibits often focus on how the evolution of mechanical and electromechanical games dating back to the 1880s led to and inspired the video games of today. Additionally, the MOG hosts several substantial community-initiated resources with its origins on 1980s message forums and the CompuServe online service: an online game encyclopedia (renamed the Killer List of Videogames [KLOV] in 1991 and taken over in 2000) and a coin-op game census project (finally named the Vintage Arcade Preservation Society [VAPS] in 1990 and taken over in 2006). Several hundred thousand pages of PDFs and other online reference material started being added in 2008, and physical on-site library services began in 2009 (https://www.arcade-museum.com/).

Enthusiasts in England, the Netherlands, and the United States have each independently set up a National Videogame Museum. The National Videogame Museum, which opened in 2015 and relocated in 2018 to Sheffield, England, presents three floors of playable games and rentable space for birthday parties and other events. It specifically strives to introduce young people to video game design and development (https://www.thenvm.org/). The Nationaal Videogame Museum, founded circa 2017, in Zoetermeer, the Netherlands, is centered on the entertainment side of game museums, with a classic arcade offering numerous playable coin-operated video games as well as a few cabinets and displays of handheld, console, and computer game technology (https://www.nationaalvideogamemuseum.nl/). The suburbs of Dallas, Texas, provide the location of the National Video Game Museum in the United States. Its primary focus is on extensive historical displays of console and handheld video game history, with a supporting room offering playable retro coin-operated machines. Temporary shows and exhibits began circa 1999. There was a Kickstarter campaign in 2011, and it opened in 2014 (http://nvmusa.org/).

Just outside the city center in Sydney, Australia, is the Retro Video Game Museum, a free permanent and static historical display area at the back of the back of the Gamesmen, a video game retailer founded in 1982. The small space holds multiple cases of retro console game history and two life-size character statues (https://www.gamesmen.com.au/).

The Strong Museum of Play in Rochester, New York, is focused on numerous areas of “play.” Its extensive, professionally produced, and highly visited exhibits are balanced with ever-growing and well-funded archiving, preservation, and academic efforts. The Strong is particularly active in the acquisition of industrial libraries and related holdings from video game companies and individual designers. The Strong’s video game activities occur under a variety of brands, including the International Center for the History of Electronic Games (ICHEG) and the World Video Game Hall of Fame. The Strong was founded in 1969 and opened in 1982. It was reoriented from a focus on regional history to a “play” theme that included video games in 2006 (https://www.museumofplay.org/).

The Video Game Museum of Rome features exhibits of approximately five hundred items and one hundred explanatory panels. Most of this is focused on console history, although there is some coverage of coin-operated machines and modern-day virtual reality (VR) technology. Its *E.T.: The Extraterrestrial* (1982) exhibit on items recovered from the excavation of the Atari video game burial in Alamogordo, New Mexico, is particularly memorable. The museum was established in 2012 (http://www.vigamus.com/).

ADDITIONAL MUSEUM PROJECTS

Australia: The Australian Centre for the Moving Image (ACMII) in Melbourne is Australia’s national museum of film, video games, digital culture, and art. During the 2015–16 fiscal year, 1.45 million people visited the ACMI. In May 2019, the ACMIA closed to the public to begin a $40 million redevelopment, with a scheduled reopening in mid-2020 (established 2002, https://www.acmi.net.au/).

Australia: The Nostalgia Box in Perth, Australia, is a private interactive museum of console video game history (opened 2015, https://thenostalgiabox.com.au/).

Estonia: The LVLUP! Interactive Videogame Museum is a small museum with both exhibit cabinets and playable games. It can be exclusively rented out (founded 2018, http://lvlup.ee/).

Finland: The Finnish Museum of Games in Tampere, Finland, is uniquely dedicated to the history of Finnish games. After starting with a crowdfunding campaign, it received over one hundred thousand visitors in the first six months of its opening in 2017 (founded 2017, http://vapriikki.fi/en/pelimuseo/)

Germany: The Binarium in Dortmund, Germany, focuses on all areas of German "digital culture." This includes video game consoles, handheld games, electronic toys, calculators, and home computers (founded 2011, opened 2016, https://binarium.de//en/start).

Portugal: The Nostalgica Museum of Videogames and Technology has over three hundred computers, consoles, and gadgets, including video games as well as other technology from the 1970s through the present (https://nostalgica.pt/).

South Korea: The Nexon Computer Museum on Jeju Island combines exhibits with playable console machines. One of the key pieces in its collection is an original Apple I computer, which it purchased at a Sotheby's auction in 2012 for $374,500 (opened 2013, https://nexoncomputermuseum.org/).

Ukraine: The Software and Computer Museum displays machines that range from the Magnavox Odyssey to the Apple II GS (founded circa 2017, https://sncmuseum.org/).

United States, California: The Digital Game Museum in Silicon Valley develops special exhibits for enthusiast shows and exhibitions. It is currently working to raise funds for its own display space (efforts began circa 2009, https://www.digitalgamemuseum.org/).

United States, California: The Museum of Art and Digital Entertainment (MADE) in Oakland has a mission to collect, curate, and present video games (primarily console, computer, and handheld games) and game art (established circa 2010, Kickstarter campaign and opening 2011, https://themade.org/).

United States, New Hampshire: The American Classic Arcade Museum, located within the Funspot family entertainment center since 1998, features more than 250 vintage video game and pinball machines available for play (incorporated as a nonprofit organization in 2002, https://www.classicarcademuseum.org/)

United States, Washington State: The Museum of Pop Culture (MoPOP) in Seattle is a well-supported museum founded by Microsoft cofounder Paul Allen, in a building designed by famed architect Frank O. Gehry. It features exhibits covering multiple areas of pop culture, including a video game exhibit entitled the *Indie Game Revolution*. MoPOP evolved from efforts dating to 1996 and 2004, and it was rebranded in 2016 with a mission that specifically included video games (https://www.mopop.org/).

Globally: Several museums, including the Smithsonian American Art Museum, have hosted their own temporary exhibits, and many others have hosted traveling video game exhibits. These traveling exhibits include *Game On*, which has been seen by over two million people in over twenty countries between 2002 and 2019, and *Videotopia*, which appeared in thirteen museums and science centers across the United States from 1996 through 2011.

Greg McLemore

See also: International Center for the History of Electronic Games; Museum of the Game; Strong National Museum of Play; *Videotopia*; Vintage Arcade Preservation Society; World Video Game Hall of Fame

Further Reading

Berick, Michael. "8 Best Arcades and Game Museums in the U.S." TravelAge West, June 30, 2016. Available at https://www.travelagewest.com/Travel/USA-Canada/8-Best-Arcades-and-Game-Museums-in-the-U-S-.

Morris, Steven Ray. "Your Mostly-Comprehensive Guide to Video Game Museums around the World." Geek & Sundry, March 31, 2016. Available at https://geekandsundry.com/your-guide-to-video-game-museums-around-the-world/.

Video Game Novels

The novel is a genre of literature, typically a printed, "long fictional prose narrative," "representing character and action with some degree of realism and complexity" (OED). Often distinguished from the epic, "a finished, [closed], generic form" transferring representation "to an absolute past of national beginnings and peak times," the modern novel form (early eighteenth century onward) is open, unfinished, and expresses the author's contemporary reality (Bakhtin 2008, 15; cf. Lukács 1971; cf. Watt 1964). Indeed, representing reality, literary critic Ian Watt proposes, is the novel's "primary convention" (32). This convention, or "formal realism," connotes the novel's aspiration to provide "a full and authentic report of human experience . . . [that] satisf[ies] its reader with such details of the story as the Individuality of the actors concerned [and] the particulars of the times and places of their actions" (32). Because the novel seeks to represent the present, both its form and notion of *realism* are mutable, open, and actualized as history unfolds. As Russian philosopher, Mikhail Bakhtin, writes, the novel is "plasticity itself" (2008, 39), a "zone of direct contact with developing reality" (2008, 3) "that continues to develop, that is as yet uncompleted." The novel is forever novel. It forms and reforms across and within respective milieus.

It follows, therefore, that late twentieth-century to early twenty-first-century novels express so-called digital culture in both form and construction of "reality." The *video game novel*, in its appropriation of the formal attributes, tropes, experiences, and culture of digital games, is one such expression. Indeed, the video game novel exemplifies what media scholar Henry Jenkins refers to as contemporary "convergence culture" in which, due to various cultural, technological, and economic factors, existing forms and genres frequently combine to make new ones (Jenkins 2006).

This entry provides a taxonomy of nonmutually exclusive, subgeneric tendencies under the broad designation *video game novel*—the ludic novel, the gamer novel, and video game novelization—with attention paid to respective precursors. To distinguish from discourse on electronic literature and games, *novel* here denotes "long fictional prose narrative[s]" primarily appearing in print.

LUDIC NOVELS

Referred to as both "ludic" (Kuehl 1986; Detweiler 1976; Condis 2016) and "gamic" (Jupin 2015) fiction, ludic novels employ formal attributes associated with games—play, nonlinearity, interactivity, rules, and boundaries—with varying degrees of intensity (cf. Ensslin 2014, 27–31). As ergodic texts, traversing the ludic novel entails "non-trivial effort" (Aarseth 1997, 1); to comprehend its storyworld, the ludic novel "*require[s]* game-playing and puzzle-solving of readers" (Condis 2016, 2). In short, not only does the ludic video game novel concern video games, but it is also, itself, a game. Examples of this "transfection of gamic conventions" (Galloway 2006, 62) into print novels about video games include the "Easter egg hunt" embedded in Ernest Cline's *Ready Player One* (2011), the fragmentary clues readers must piece together throughout Neal Stephenson's *Reamde* (2011), Cory Doctorow's downloadable and remixable *For the Win* (2010), and the cheat-code-esque "crib sheet" accompanying Charles Stross's first-person-shooter-style *Halting State* (2007) (Jupin 2015, 76). Besides early text-based adventure video games (such as *Colossal Cave Adventure* [1976]), nonprint precursors for playful, interactive storytelling range from tabletop role-playing games (RPGs) like Dungeons and Dragons (1974) to oral, round-robin storytelling. Playful print antecedents requiring forms of ergodic traversal include biblical glosses (Ensslin 2014, 11), Dadaist "cut-ups," Doris Webster and Mary Alden Hopkins's *Consider the Consequences!* (1930), Jorge Luis Borges's *The Garden of Forking Paths* (1941), Alan George's *Treasure Hunt* (1945), Robe-Grillet's novels, *TutorText* interactive textbooks inspired by B. F. Skinner (1958–72), Vladimir Nabokov's *Pale Fire* (1962), B. S. Johnson's *The Unfortunates* (1969), postmodern fiction (cf. Edwards 1998), and gamebooks (cf. Katz n.d.) popularized by the *Choose Your Own Adventure* franchise (1979–98).

GAMER NOVELS

There cannot be a video game novel without video games. Where the ludic novel provides a formal expression of games in general, the gamer novel invokes the realities of video game culture as content: "the fiction in which particular games are portrayed and indeed usually form the foundation of plot, characterization, or imagery" (Detweiler 1976, 48). Analogue precursors include sport-oriented novels such as A. G. Macdonell's *England, Their England* (1933); Robert Coover's *The Universal Baseball Association* (1968); Michael Murphy's *Golf in the Kingdom* (1971); and Haruki Murakami's *Pinball, 1973* (1980). With its unlikely gamer heroes and focus on advanced technology, however, critics typically draw connections to speculative cyberpunk fiction (cf. Condis 2016; cf. Sterling 2003 for "cyberpunk") such as William Gibson's *Neuromancer* (1984), Orson Scott Card's *Ender's Game* (1985), Neal Stephenson's *Snow Crash* (1992), and Tad Williams's *Otherland* tetralogy (1996–2001).

Like cyberpunk fiction, the gamer novel might tell stories within video game/virtual reality (VR) worlds or about video game playing, but, most significantly, it mobilizes a field of referents shared by readers embedded in gamer culture. Examples include Terry Pratchett's *Only You Can Save Mankind* (1992), D. B. Weiss's *Lucky Wander Boy* (2003), Dennis Cooper's *God Jr.* (2005), Ernest Cline's *Ready Player One* (2011) and *Armada* (2015), Christopher John Farley's *Game World* (2014), Cory Doctorow and Jen Wang's graphic novel *In Real Life* (2014), Keith Stuart's *A Boy Made of Blocks*, Marie Lu's *Warcross* series (2017–), Douglas Lain's *Bash Bash Revolution* (2018), and Jason Segel and Kirsten Miller's *Otherworld* (2018). Representation of video game development is also a significant trend. Often semiautobiographical, video game design novels are typically focalized through people involved in the game industry. Examples include Douglas Coupland's *JPod* (2006) and Austin Grossman's *You* (2013).

VIDEO GAME NOVELIZATIONS

The video game novelization is predicated on a long history of transmedial adaptation (cf. Hutcheon 2013, Sanders 2016). Sometimes known as *tie-ins*, these derivative novels adapt the story or storyworld—heterocosm (Hutcheon 2013, xxiv)—created for a published, usually popular, video game. While other video game novel types listed here make reference to or take on the tropes of specific video games, these books attempt a direct transposition of a video game title into a novel. Notable examples of adapted franchises include *Assassin's Creed*, *Diablo*, *Halo*, *Myst*, *Resident Evil*, *StarCraft*, and *World of Warcraft*. Typically, companies contact and invite authors to write the novelization. According to the International Association for Media Tie-In Writers, companies require more than a "word-for-word regurgitation of their game" and encourage authors to develop characters, parallel stories, and subplots—"[t]he key is to tell the story that never made it to the screen" (Dietz n.d.).

In sum, the video game novel might tell stories within video game worlds, about video game playing, or about video game making; employ the tropes of video games for content; or take on the formal components of games. In this way, the conventional "realism" of the modern novel now firmly enfolds our virtual, pixelated lives.

Doug Stark

See also: Video Games and Literature

Further Reading

Aarseth, Espen. *Cybertext: Perspectives on Ergodic Literature*. Baltimore, MD: Johns Hopkins University Press, 1997.

Andrews, Jim. "Videogames as Literary Devices." In *Videogames and Art*, edited by Andy Clarke and Grethe Mitchell, 54–58. Bristol, England: Intellect, 2007.

Bahktin M. M. *The Dialogic Imagination: Four Essays*. Edited by Michael Helquist. Translated by Carlyl Emerson and Michael Helquist. Austin: University of Texas Press, 2008.

Beller, Jonathan. *The Message Is Murder*: *Substrates of Computational Capitalism*. London: Pluto Press, 2018.

Condis, Megan Amber. "Playing the Game of Literature: *Ready Player One*, the Ludic Novel, and the Geeky 'Canon' of White Masculinity." *Journal of Modern Literature* 39, no. 2 (2016): 1–19.

Detweiler, Robert. "Games and Play in Modern American Fiction." *Contemporary*

Literature 17, no. 1 (1976): 44–62.

Dietz, William C. "How to Novelize a Game." *International Association for Media Tie-In Writers*. Accessed October 3, 2020. Available at https://iamtw.org/articles/how-to-novelize-a-game/.

Edwards, Brian. *Theories of Play and Postmodern Fiction*. New York: Garland Publishing, 1998.

Ensslin, Astrid. *Literary Gaming*. Cambridge, MA: MIT Press, 2014.

Galloway, Alexander R. *Gaming: Essays on Algorithmic Culture*. Minneapolis: University of Minnesota Press, 2006.

Granshaw, Lisa. "From Screen to Page: Authors Talk Bringing Video Game Novels to Life." SYFY Wire, June 15, 2016. Available at https://www.syfy.com/syfywire/screen-page-authors-talk-bringing-video-game-novels-life.

Hutcheon, Linda, with Siobhan O'Flynn. *A Theory of Adaptation*. 2nd ed. New York: Routledge, 2013.

Jenkins, Henry. *Convergence Culture: Where Old and New Media Collide*. New York: New York University Press, 2006.

Jupin, Tanner J. *Gamic Fiction: The Intermediation of Literature and Games*. Doctoral diss., University of California, Davis, 2014. UMT, 2015.

Katz, Demian. "Demian's Gamebook Web Page." Accessed October 3, 2020. Available at http://www.Gamebooks.org.

Kuehl, John. "The Ludic Impulse in Recent American Fiction." *Journal of Narrative Technique* 16, no. 3 (1986): 167–178.

Lukács, Georg. *The Theory of the Novel: A Historico-Philosophical Essay on the Forms of Great Epic Literature*. Translated by Anna Bostock. Cambridge, MA: MIT Press, 1971.

Miller, Vincent. *Understanding Digital Culture*. Thousand Oaks, CA: Sage, 2011.

Sanders, Julie. *Adaptation and Appropriation*. 2nd ed. New York: Routledge, 2016.

Skinner, B. F. "Teaching Machines." *Science* 128, no. 3330 (October 24, 1958): 969–977.

Sterling, Bruce. Preface to *Burning Chrome*, by William Gibson, xi–xiv. New York: HarperCollins, 2003.

Watt, Ian. *The Rise of the Novel: Studies in Defoe, Richardson and Fielding.* Oakland: University of California Press, 1964.

Video Game Studies

Video game studies is multidisciplinary, combining elements from many fields, although the majority of them come from media studies and traditional game studies. Although game studies in general looks at play and games in the broadest sense of the term, video games studies looks more narrowly at video games and must take video game technology and conventions into account.

Because video games are also an industry, a technology, an art, a form of communication, an educational tool, and a social tool, video game studies tries to encompass all these things and examine how they are related. The academic study of video games began slowly, arising first in the 1970s as the subject of discussion for homebrew electronics hobbyists who built their own computers and programmed their own games. During the 1980s, video game designers began writing about their ideas and work and occasionally theorizing about video games, perhaps most notably in Chris Crawford's *The Art of Computer Game Design* (1982). The 1980s and 1990s also saw the rise of academic interest in video games from a psychological perspective, particularly in the areas of aggression, socialization, and other health issues. In the late 1990s and early 2000s, video games began to be addressed from the perspective of media studies and were compared with other media, such as film, television, and interactive fiction or hyperfiction. During this time, video game studies concentrated on demonstrating the unique qualities of video games as media objects and argued that a new field of study was needed to take these aspects into account. Only once the field became more established late in the first decade of the twenty-first century could books and writings take for granted that video game studies had become an accepted area of study unto itself. This same decade also saw the increase of conference papers, online journals such as *Game Studies*, and, finally, entire conferences devoted to video game studies. Today, video game studies has become one of the fastest-growing branches of media studies.

Because *studies* is a broad term, *video game studies* includes not only theory but history as well. Video game history began with historical summaries found in magazines, such as the multipart "Electronic Games: Space-Age Leisure Activity" by Jerry and Eric Eimbinder, which began in the October 1980 issue of *Popular Electronics*, and later in early books such as George Sullivan's *Screen Play: The Story of Video Games* (1983), which was intended for a juvenile audience. Interest in video game history picked up during the 1990s, with Leonard Herman's *Phoenix: The Fall & Rise of Videogames* (1994), being the first history of video games written for an adult audience, and in the next two decades, a number of books on video game history would appear, from books on individual companies to more general histories, written from popular, journalistic, and academic perspectives, and a variety of websites on video game history exist as well.

Video game studies also brings video game history and theory together in the examination of how video game designs, genres, and conventions grew over time and how these were affected by such things as programming languages, available technology, business practices, popular culture and cultural norms, and exchanges and influences from other media and media forms, including film, television, computers, role-playing games (RPGs), board games, sports, and puzzles. The form, content, and context of video games and how they are related are also subjects of study.

In addition to being a branch of media studies, video game studies has renewed interest in traditional game studies, which has provided concepts and tools useful to the study of video games. In this perspective, it is significant to establish exactly what a game is (see Game, Definition of) to understand games in regard to criticism, analysis, and design. Other overlapping areas and issues shared by video game studies and traditional game studies include the study of play and players, game structures, game aesthetics, and game culture.

Although video game studies is new enough that various "schools" have not yet coalesced, some have suggested that early on a debate existed between narratologists, who argue that video games should be analyzed as narrative forms, and ludologists, who argue that games should be analyzed from the perspective of game studies; yet, in the end, these two positions were not seen as being irreconcilable but rather complementary aspects. Today, video game studies is incorporating an ever-widening set of approaches, using analytical tools from a diverse range of fields, including art and aesthetics, artificial intelligence (AI), business and industry, communication and social science, media studies, game studies, computer graphics and programming, education, philosophy, semiotics, psychology, human-computer interaction, and more. Each of these fields has its own discussions of the capabilities and uses of today's video games as well as what they could become in the future. For example, social scientists have studied the communal aspects of massively multiplayer online role-playing games (MMORPGs); in the field of psychology, much discussion has occurred regarding the connection between video games and aggressive behavior; and in the field of education, video games are studied as educational tools. Video games studies can therefore be seen as a nexus where all these questions and concerns intersect and interact.

Mark J. P. Wolf and Lars Konzack

Further Reading

Crawford, Chris. *The Art of Computer Game Design*. Berkeley, CA: McGraw-Hill/Osborne Media, 1984. Available at http://www.vancouver.wsu.edu/fac/peabody/game-book/#game.

DeMaria, Rusel, and Johnny L. Wilson. *High Score!: The Illustrated History of Electronic Games*. Berkeley, CA: McGraw Hill/Osborne, 2002.

Greenfield, Patricia Marks. *Mind and Media: The Effects of Television, Video Games, and Computers*. Cambridge, MA: Harvard University Press, 1984.

Herman, Leonard. *Phoenix: The Fall & Rise of Videogames*. 3rd ed. Springfield, NJ: Rolenta Press, 2001.

Juul, Jesper. *Half-Real: Video Games between Real Rules and Fictional Worlds*. Cambridge, MA: MIT Press 2005.

Kent, Steven L. *The Ultimate History of Video Games: The Story behind the Craze That Touched Our Lives and Changed the World*. New York: Three Rivers Press, 2001.

King, Geoff, and Tanya Krzywinska. *Tomb Raiders & Space Invaders: Video Game Forms and Context*. New York: I. B. Tauris, 2006.

Lammers, Susan. *Programmers at Work*. Redmond, WA: Microsoft Press, 1986.

Mäyrä, Frans, ed. *CGDC Conference Proceedings*. Tampere, Finland: Tampere University Press, 2002–Present.

Perron, Bernard, and Mark J. P. Wolf, eds. *The Video Game Theory Reader 2*. New York: Routledge, 2008.

Salen, Katie, and Eric Zimmerman. *Rules of Play: Game Design Fundamentals*. Cambridge, MA: MIT Press, 2003.

Taylor, T. L. *Play between Worlds*. Cambridge, MA: MIT Press, 2006.

Wolf, Mark J. P., ed. *Before the Crash: Early Video Game History*. Detroit, MI: Wayne State University Press, 2012.

Wolf, Mark J. P., ed. *The Video Game Explosion: A History from PONG to PlayStation and Beyond*. Westport, CT: Greenwood Press, 2007.

Wolf, Mark J. P., and Bernard Perron, eds. *The Video Game Theory Reader*. New York: Routledge, 2003.

Video Games and Literature

Throughout cultural history, we can observe how different media influence and transform each other. The intermedial exchange is not the exception but the rule. Traditionally, the relationship between literature and play is particularly close, as Johan Huizinga noted in his study *Homo Ludens: A Study of the Play-Element in Culture* (1938). For video games, two types of intermedial influence can be distinguished: first, the historical impact of literature on the emergence of digital games as a narrative medium and, second, the current interrelations between literature and games.

In the early twentieth century, several decades before the emergence of video games, aesthetic desires for new multilinear and interactive forms of narration became apparent. The literary avant-gardes reacted to them first. In the 1920s, the Dadaists and the Surrealists started to experiment with ludic approaches in writing literary texts under the constraints of gamelike rules. Tristan Tzara, for example, tried to create poems by pulling words out of a hat, and André Breton and fellow surrealists experimented with several methods of automatic writing. In 1941, Jorge Luis Borges's short story "The Garden of Forking Paths" suggested the concept of branching text as it was later developed in the form of text adventures and hypertext novels. In 1961, Marc Saporta published *Composition No. 1,* 150 unnumbered pages delivered in a box to be read in arbitrary order, and Raymond Queneau published *Hundred Thousand Billion Poems*, a specially designed book of ten sonnets whose lines could be randomly combined. Two years later, Julio Cortazar's novel *Hopscotch* invited its readers to follow different reading paths. In 1967, Queneau published the multiple-choice short story "A Story as You Like It," which anticipated the genre of adventure books or gamebooks that would become popular about a decade later.

These examples and many others of the 1950s and 1960s document how literary experiments tested narrative forms and effects in analog media that video games would later realize in the new digital medium of software. Common to these literary experiments was that they attempted to overcome the linearity of storytelling and to reduce the dominant role of the author in favor of the recipients' agency.

In the 1970s, digital games started to catch up with the experiments of the literary avant-gardes when text-based adventure games, first on university mainframes and later on personal computers, allowed players to navigate branching plots by answering text prompts. The prototypical game of this emerging genre was to become the *Colossal Cave Adventure* (1976). Originally based on the real-world experience of spelunking, several revisions added elements of the then new analog roleplaying game Dungeons & Dragons (published in 1974) and of literary fantasy in the Tolkien tradition. Other influential text adventures were *Zork* (1977–82) and *Mystery House* (1981) and two literary adaptations: the text adventure versions of Douglas Adams's novel *The Hitchhikers Guide to the Galaxy* (1983) and Ray Bradbury's *Fahrenheit 451* (1986).

With text adventures, games started to develop their very own modus of narration. The genre proved that games, while using the model of literature, could overcome more than some of the limitations of storytelling in analog media and provide a unique narrative experience. Whoever typed their way through these "webbed" text passages was introduced to new experiences of decision making and independence and of immersion and calculation. The gameplay, however, was constrained by the ability or, rather, inability of contemporary programs (the "parsers" of text adventures) to understand natural language input. A logical next step was to create multiplayer versions to replace at least parts of the interaction with the software by interaction with more "understanding" humans. At the end of the 1970s, the game *MUD* (*Multi-User Dungeon*) went online, again on a university mainframe, and gave the new genre its name. In 1981, this first MUD was connected to the ARPANET and became the first internationally networked online game.

The development of digital storytelling following the 1970s changed the new medium of digital games. Until then, video games were purely ludic and often just procedural adaptations of analog games such as chess or table tennis. Now digital games gained the affordance of narrative expression. Using the specific abilities of digital textuality for multilinearity, text adventures and later graphic adventures enhanced storytelling far beyond the possibilities of analog literature. Most importantly, temporal linearity as it characterizes literary, as well as cinematic storytelling, is complemented with or replaced by spatial forms of narration whose temporal dimensions are realized anew with every playthrough.

Presently, the intermedia relations of literature and games are characterized by two major exchanges. First, there are direct adaptations of work: literature to games and games to literature. Hundreds of games are based on novels, short stories, poems, and theater plays. Authors whose works have been adapted range from Dante to Poe to Lewis Carroll to Kafka and from Tolkien to Tom Clancy to J. K. Rowling to Andrzej Sapkowski. An extraordinarily successful adaptation of literature is the *Witcher* trilogy, having sold more than thirty-three million copies worldwide. Even more widespread is the literary practice of adapting games or extending their storytelling through the novelization of prequels, interludes, and sequels. Several hundreds of such novels are available; for example, there are nine novels set in the *Assassin's Creed* universe and two dozen novels set in the *Halo* universe (see Video Game Novels).

Second, there are the more indirect but at the same time broader influences of literary works on games. Genre exchange plays a particularly important role. Video games were and are profoundly affected by science fiction, fantasy, and horror literature (and movies of these genres which themselves are often based on genre literature). Many successful games of the last decade also employ literature, literary techniques, and narrative styles. Some simply integrate reading material into their worlds: the *Deus Ex* series (2000–16), for example, offers texts of many genres, from newspaper clippings to letters to cooking recipes to excerpts from a G. K. Chesterton novel, and *Skyrim* (2016) includes hundreds of books with thousands of pages. Other games make use of established literary forms and devices, such as the epistolary novel (*Dear Esther* [2010]) or the unreliable narrator (*The Stanley Parabl*e [2011] and *The Beginner's Guide* [2015]). The reverse case—the influence of video games on contemporary literary storytelling —is harder to assess, and research is still required.

Gundolf S. Freyermuth

See also: Video Game Literacy; Video Game Novels

Further Reading

Jenkins, Henry. "Game Design as Narrative Architecture." In *First Person: New Media as Story, Performance, and Game*, edited by Noah Wardrip-Fruin and Pat Harrigan, 119–129. Cambridge, MA: MIT Press, 2004.

Montfort, Nick. *Twisty Little Passages. An Approach to Interactive Fiction*. Cambridge, MA: MIT Press, 2005.

Wolf, Mark J. P. "Space in the Video Game." In *The Medium of the Video Game*, edited by Mark J. P. Wolf, 51–75. Austin: University of Texas Press.

Video Games as Collectibles

Video games, whether on disc or diskette, cartridge or CD-ROM, were once objects you could hold in your hand, you could put them on a shelf, and you could collect them. But with online portals and direct downloading, games as physical products are gradually becoming a thing of the past, which may signal an end to video games as collectibles.

THE RISE OF COLLECTIBLES AND COLLECTING

Items that people collected have been around ever since objects and materials have been used as currencies, and people have long collected books and works of art. But the idea of *collectibles*—objects that are deliberately designed to be collected or made with collecting in mind—has been around since 1875, when cigarette cards first appeared. Cigarette cards were trading cards included in packs of cigarettes, with hand-painted images of national flags, Indian chiefs, and wild animals, but the best-known cigarette cards had images of baseball players; these started the sports cards industry. The second-most expensive baseball card in the world is the Honus Wagner cigarette card, which sold for $3.12 million in 2016. The card is very rare because Wagner was antismoking and threatened legal action if the card was released, so only a few ever made it into circulation.

Collecting became more popular during the prosperity of the Industrial Age and the early twentieth century, when merchandise and memorabilia were produced. But the rise of collectibles and collecting culture as we know it today occurred during the 1960s and 1970s. Several factors may account for this, such as the rise of merchandising and franchising, along with the rapid cultural change of the time, which led to a greater nostalgia for the past, along with marketing done with that nostalgia in mind, such as George Lucas's 1973 film *American Graffiti*, which started the genre of the nostalgia film. Movie card collecting and other kinds of nonsport cards joined sports card collecting, and during the 1960s and onward, companies such as Topps, Fleer, and Donruss expanded out from sports into other areas, appealing to the growing fan bases of movies and television shows.

Collecting can be seen as a desire to keep the past intact, in the form of artifacts, and the later shifts from analog to digital technology brought further cultural change as well as attention to the physicality of objects. Faster cultural change leading to faster obsolescence increased some items' rarity, making them more desirable to the collector; in this way, collecting can be something like a game itself. Rarer items are more difficult to find, and collections are considered less complete without them. It should also be noted that companies selling items intended as collectibles often sold the items individually, not as complete sets, to make the completed collection a more elusive goal. The gamelike nature of collecting suggests that it may appeal to gamers and help video games become collectibles as well.

VIDEO GAMES AS COLLECTIBLES

Video games, appearing commercially in the 1970s and becoming a cultural force during the late 1970s and 1980s, grew up alongside these trends and became a part of them as generations of console technology began replacing older systems, gradually becoming collectibles themselves. Video games began to be seen as collectibles when games were separated from the consoles that played them, with the idea of removal game cartridges. When Atari allowed the third-party production of cartridges for the Atari VCS 2600, dozens of companies came out with games for the system, many of which were produced in relatively small numbers, leading to their greater rarity in the future. Handheld game series, such as Nintendo's Game & Watch series, also encouraged buyers to start a collection. The idea of collecting changed marketing insofar as it was not the selling of a single product but a line of products to which new products were continually being added, so the buyer's goal was not just the ownership of a product but of an entire collection, seen as a whole.

As time went on, video game technology advanced, with new console generations appearing about twice a decade on average, a much faster advance than technological generations in any other areas. As games and systems quickly receded into the past, nostalgia grew in the form of retrogaming and video game collecting, both of which were aided by the World Wide Web, which made it easier for collectors to find and trade information. The decline of the video game arcade and nostalgia for its brief golden age led to game collecting groups such as the Video Arcade Preservation Society (VAPS), which began in the 1980s and today has over ten thousand members in seventy-one countries. Internet auction sites such as eBay have also helped raise the prices of rare games by casting a wider net for buyers.

Video games, and collectibles in general, are more valued the rarer they are. The Atari cartridge *Atlantis II* (1982), for example, was only offered as a reward to high-scoring players of the much more common *Atlantis* (1982) who photographed their high scores and sent them in to receive the sequel, which was never sold commercially. Today, the cartridge is valued at about $6,000 (Lammle 2011). Other rare cartridges for the Atari VCS 2600 have sold for even higher prices; in 2012, Inspirational Video Concepts' *Red Sea Crossing* (1983) sold for $10,400, and in 2010, Men-A-Vision's *Air Raid* (1982) sold for $33,433 (Sharp 2019). However, the most expensive video game ever sold was a cartridge for the Nintendo Entertainment System (NES). Nintendo hosted the Nintendo World Championships in 1990, which used custom cartridges made especially for the event. Ninety were made in gray, like other Nintendo cartridges, but twenty-six more were made in gold and given away as prizes. As the rarest NES cartridge, the gold version sold for $100,088 on eBay in 2014 (Sharp 2019).

Game cartridges are able to attain such values due to their physical nature. Downloadable games that are endlessly copyable and are not tethered to a physical container have lost their physicality and status as objects, and even though they are arguably more ephemeral and vulnerable to erasure and disappearance, one copy is enough to reproduce the game many times over and quickly reverse the declining number of copies. Physical artifacts such as cartridges were more expensive to make, but they also made piracy more difficult, which was another advantage for collectors, who would want to avoid counterfeit games.

Physical game cartridges and other media are objects that can be preserved and archived as well as displayed in museums and other exhibitions, helping to keep an interest in the medium's past. As a physical object, the game was expected to have paratextual and extratextual materials, such as the game manual, the box, and other packaging, and sometimes the additional items included in collector's editions, such as figurines, soundtracks, cloth maps, or other such items. These things often became valuable to collectors, and they were sometimes even rarer than the game cartridges themselves, as things such as packaging tend to be discarded and not saved (although this would change sometime during the 1990s or so, when people began to realize the value of such things as collectibles, and so more people began saving packaging). These items are sometimes even bought and sold separately from the game cartridges; the box for *Stadium Events* has been known to sell for as much as $10,000 (Lammle 2011).

The physicality of video game cartridges means they can be archival objects, to be cataloged, stored, preserved, and exhibited later. Even when video games moved from cartridges to optical discs, there was still a physical container for the game, though admittedly a more vulnerable one. Just as one could take a cartridge or a disc over to a friend's house and play the game on his or her system, the physical manifestations of video games preserve them better over time, though of course the console systems need to be preserved as well. A game on a cartridge or disc can be played on any console of the right type and does not need to be stored on the console, as a downloaded game does, taking up memory and ultimately limiting how many games can be played on a particular console.

THE FUTURE OF VIDEO GAMES AS COLLECTIBLES

Now that video games are often sold directly to consumers as downloads or data streams, many are no longer sold as data stored on physical carriers such as cartridges or discs, which means that they are far less likely to become collectibles in the future. And because they are stored directly on the hard drives of computers or consoles, they are more vulnerable to being lost or erased or simply not saved when players make room for newer games. Still, systems that use game media, such as the Nintendo Switch as well as handheld games, will allow the video game to continue as a collectible. System hardware can also become collectible, along with peripherals and other such items, but most of them will be of limited value due to the large number of systems that are normally produced. And, naturally, older video games will remain collectible, as they grow even older and rarer as time goes by.

Mark J. P. Wolf

See also: Collecting Video Games; Retrogaming

Further Reading

Lammle, Rob. "8 Very Rare (and Very Expensive) Video Games." Mental Floss, January 3, 2011. Available at http://www.cnn.com/2010/LIVING/03/20/mf.rich.off.video.games/index.html?hpt = C2?cnn = yes.

Sharp, Nathan. "The 30 Rarest Console Games Ever (and How Much They're Worth)." TheGamer, January 16, 2019. Available at https://www.thegamer.com/console-games-rarest-ever-worth/.

Video Games within Video Games

Some video games give players the opportunity to play analog games as part of the gameplay itself. Card games are especially popular, with different versions in different titles, such as Caravan in *Fallout: New Vegas* (2010) and traditional games of poker in *Far Cry 3* (2012). We also find other popular games, such as Liar's Dice in *Red Dead Redemption* (2010) or billiards in *Grand Theft Auto: San Andreas* (2014) and *Grand Theft Auto IV* (2018). However, there are instances of video games where players can play video games within the video game itself. Among the earliest examples of video games within a video game are the fictional arcade games *Ship Chip Lander* and *Rubber Gut* found within the diegesis of *Cosmic Osmo: The Worlds beyond the Mackerel* (1989), which the player can actually play within the game. While some games within games are fictional, in other cases, the featured titles are influential video games of the past. This can be seen as a tribute to the video games that shaped the earlier years of the industry and paved the way for the titles to come. Other times, the video game inserts itself as another version of the main video game the player is playing.

Call of Duty: Black Ops (2010) is a first-person shooter (FPS) developed by Treyarch and released for PC, PlayStation 3 (PS3), Xbox 360, and Wii. The game follows CIA operative Alex Mason as he travels to different locations around the globe in the 1960s, during the Cold War. Players have to get up from the chair in the main menu and walk up to a computer terminal in the background. If they type "Zork" in that terminal, they can unlock the original game. *Zork I* (1980) is among the earliest text adventure games. To explore the digital world of *Zork*, players type commands that allow them to move and interact with objects. If players type "DOA" in the same terminal, they unlock *Dead Ops Arcade*, a twin-stick top-down shooter, where the main objective is to survive for as many rounds as possible while fighting increasingly difficult waves of zombies.

Fallout 4 (2015) is a postapocalyptic action role-playing game (RPG) developed by Bethesda Game Studios and released for PC, PlayStation 4 (PS4), and Xbox One. The game takes place in the city of Boston and the surrounding area of Massachusetts. The main character, the "Sole Survivor," explores the wasteland in search of his/her missing son while completing objectives and helping the different factions. The protagonist was in a cryogenic state in Vault 111, an underground refuge. When players explore the ruins of said Vault, they discover a video game called *Red Menace* in the recreational terminal in the cafeteria of Vault 111. In *Red Menace*, a Vault-Tec Boy has to rescue a Vault Girl from an alien-looking Chinese flag that drops bombs and barrels while the Vault-Tec Boy climbs the stairs, dodging bombs and jumping barrels thrown by the enemy; the game is reminiscent of the Nintendo arcade hit *Donkey Kong* (1981).

Catherine (2011) is a puzzle platformer adventure game developed by Atlus released for PS3 and Xbox 360. It was later released for PC by SEGA in 2019. The game follows the story of the protagonist Vincent, who is torn between his longtime girlfriend, Katherine, and Catherine, an attractive woman he just met. The gameplay is divided between the time Vincent spends in the Stray Sheep bar with his friends or trapped in a nightmarish world where he has to climb giant staircases using the diverse properties of the cubes that make up the staircases. When Vincent is in the bar, he can play an arcade version of his own nightmares. This video game is called *Rapunzel*. It mimics the main gameplay of *Catherine*. However, the primary difference is that *Rapunzel* gives players a limited number of moves, whereas during the main stages in *Catherine*, players have a limited amount of time to clear the stages. *Rapunzel* has 128 levels, or 64 for each mode, and the player is allowed to play three times per night. Every time Vincent beats one of the modes, he gets achievements and access to extra stages.

Video games appearing within the diegesis of other video games demonstrate how far the medium has come and a nostalgic self-reflexive tendency for the medium's own history. Such games are also an interesting way to remind players that they are playing a game, simultaneously indicating how far the medium has advanced, and some games within games become a form of self-critique that calls attention to the nature of games themselves.

Rita Santoyo Venegas

See also: Metalepsis; Minigames

Further Reading

"Game within a Game." TVTropes. Accessed October 3, 2020. Available at https://tvtropes.org/pmwiki/pmwiki.php/Main/GameWithinAGame.

Hogg, Adam. “10 Games within Video Games You Must Play.” WhatCulture.com, January 12, 2017. Available at http://whatculture.com/gaming/10-games-within-video-games-you-must-play.

Videotopia

Videotopia was a traveling exhibit (managed by Electronics Conservancy Inc.) dedicated to the art, science, and technology of video games. It was designed and assembled by Keith Feinstein with the help of a large advisory board made of game historians and key industry figures. Since its first showing in 1996 at the Carnegie Science Center in Pittsburgh, it has been showcased in a dozen major science museums around the United States, including the Franklin Institute Science Museum in Philadelphia and the Singapore Science Center. In its complete form, it featured more than one hundred arcade machines, a variety of home console systems, interactive touchscreen kiosks, and numerous information pedestals.

At the entrance of the *Videotopia* arcade, there was a two-sided kiosk entitled “That was then . . . this is now.” On one side, an Atari VCS 2600 was connected to a CRT television, and the other side featured a more recent console. Many of the arcade games featured in the exhibit represented a technological or commercial breakthrough in the history of video games. Some of the earliest coin-operated machines (*Computer Space* [1971] and *PONG* [1972]), the first game to store graphics on a ROM chip (*Tank!* [1974]), the first to use a microprocessor (*Gun Fight* [1975]), and the first to feature a two-way scrolling playfield (*Football* [1978]) were on display. The full exhibit also included laserdisc games (*Dragon’s Lair* [1983]) and a section on the evolution of three-dimensional graphics, including *Battlezone* (1980), *I, Robot* (1983), and *Virtua Racing* (1992). Many genre-defining blockbusters were featured: *Space Invaders* (1978), *Asteroids* (1979), *Pac-Man* (1980), *Donkey Kong* (1981), *Centipede* (1981), *Joust* (1982), *Tron* (1982), and *Gauntlet* (1985), to name just a few. The exhibit has been updated on several occasions with more recent games, such as the rhythm game *Hip Hop Mania Complete Mix* (1998). On its showing at the Mary Brogan Museum of Art and Science in Tallahassee, Florida, Microsoft’s Kinect peripheral for the Microsoft Xbox 360 was installed and ready to play.

The *Videotopia* exhibit sought to introduce visitors to the technological aspects that are essential to understanding the video game experience and its evolution and to demystify the creative process of these games. The “Look Inside” section included blown-up design documents, a display that revealed the inner working of typical interfaces, and two interactive information kiosks operated by touchscreen. In this section, users could learn about the different steps of the creative process—from the initial ideation to rules design and character and story creation—and major technological components: raster displays, vector displays, transistors, microprocessors, RAM and ROM chips, and so on. Additionally, many pedestals were positioned next to specific games or groups of games to give information about the design process and gameplay mechanics or to explain the evolution of a game genre (e.g., the evolution of "slide and shoot" games with *Galaxian* [1979], *Galaga* [1981], and *Xevious* [1983]). The pedestals also provided contextual information about what was happening in other cultural domains (such as the news, television, and movie theaters) when these games were released.

More than one hundred machines of the original collection have been bought by the Strong National Museum of Play in Rochester, where the exhibit was featured during the last half of 2009. *Videotopia* has played a significant role in bringing a comprehensive view of video game history to the museum space.

Carl Therrien

See also: Video Game Museums

Further Reading

Guins, Raiford. *Game After: A Cultural Study of Video Game Afterlife*. Cambridge, MA: MIT Press, 2014.

Videotopia website. Accessed October 3, 2020. Available at http://www.videotopia.com.

Vintage Arcade Preservation Society (VAPS)

The Vintage Arcade Preservation Society, originally known as the Video Arcade Preservation Society, or VAPS, is a leading organization and census project dedicated to the preservation of classic arcade and video games. More than ten thousand members in seventy-one countries have worked to preserve classic arcade machines and their history. Collectively, these members hold more than 130,000 classic coin-operated machines (over 6,400 different titles).

Just as the Killer List of Videogames (KLOV) started out as an informal list of coin-operated video games distributed via online bulletin board systems (BBSs) and CompuServe during the 1980s, VAPS began as an informal list of dedicated collectors distributed on those same systems. Both the KLOV and VAPS launched websites in 1994. A key part of VAPS was, and continues to be, an extensive and constantly updated online census of surviving coin-operated machines. VAPS utilizes the official list of games from the KLOV to determine what games can be added to its census database, and VAPS members enter in each game in their game holdings.

In 2006, the leadership of VAPS was handed over to the International Arcade Museum (IAM), both of which are now part of the Museum of the Game. In 2009, VAPS's website was moved to the site of the International Arcade Museum (www.arcade-museum.com) so that functions from each site could be better integrated and to reflect the fact that many members of VAPS were members of the KLOV and used a single social and machine preservation message forum system offered by the International Arcade Museum.

As the KLOV's and IAM's online encyclopedia began to cover more and more non–video game coin-operated machines, so did VAPS. Thus, in 2010, the Video Arcade Preservation Society was renamed the Vintage Arcade Preservation Society to better reflect VAPS's expanded mission. Today, the VAPS census project has been expanded to cover machines and parts owned, for sale, and wanted. Interpretation of census data through reports and graphs are available online, and new features are added on a regular basis.

Greg McLemore

See also: Killer List of Videogames; Museum of the Game; Video Game Museums

Further Reading

Vintage Arcade Preservation Society website. Accessed October 3, 2020. Available at http://www.arcade-museum.com/vaps/.

Violence

Research on violence in video games is typically explored in two ways: through "media effects" models inherited from studies of violent content in film and television and through sociocultural models arguing that video games and "violent game content" must be contextually situated within a broader culture of media and everyday violence.

In popular media, the relationship between violent action and violent video game content has been widely sensationalized through stories about violent and aggressive actions resulting from video game play. For example, the media blamed mass shootings in Columbine, Colorado, in 1999; Munich, Germany, in 2016; Parkland, Florida, in 2018; and many others on the violent video games that their perpetrators played. However, sensationalist media attempts to pinpoint a causal link between video game play, including commentary by U.S. president Donald Trump, who claimed that video games were to blame for a mass shooting (Scutti 2018), have not been substantiated by empirical research (APA Task Force on Violent Media 2015). Video games, just like other media, rely on and reproduce cultural norms with regard to violence, and first-person shooting video games have remained popular since their inception, despite their controversial content.

Unlike other screen-based media, however, video games uniquely position their players in active roles in relation to violent behaviors in a game; players have control over considerable violent action within the game and typically must choose violent means for conflict resolution as well as seek to be successful at it. For some researchers (Anderson 2004; Anderson, Gentile, and Buckley 2007), this "active" engagement with violence (instead of merely "viewing") increases violence-related "effects" on players, namely increased aggression. That said, whether it is the activity of the player's engagement with violent media that *produces* either temporary or longer-term violent effects, including criminal behaviors, or that there are such effects—whether cognitive, behavioral, or affective—is no longer questioned by media effects researchers, who have consistently been able to document a causal relationship between viewing/playing with violent media content and inducing violent effects (Anderson et al. 2003; Bushman and Anderson 2009).

With respect to aggression specifically, the violent video game effects literature has successfully demonstrated that there is a causal link between playing violent video games and the inducement and reinforcement of aggressive feelings and behaviors. Work by Barlett, Anderson, and Swing (2009), in a review of violence effects in literature and video games, divides the wide range of literature available on the topic into three categories: aggressive cognition, aggressive behavior, and prosocial behavior. In the first, studies have demonstrated that there is indeed a relationship between violent video game playing and "aggressive priming, activation of aggressive scripts and knowledge structures and a hostile attribution bias compared to non-violent video game exposure" (Barlett, Anderson, and Swing 2009, 382). Aggressive behavior has been measured using a variety of methods and tools, including observations, self-reports, standard laboratory tests, and so on, and has shown, through numerous comprehensive reviews, that violent video game exposure leads to increased violent behavior (Anderson et al. 2003; Anderson et al. 2004, 2007; Barlett, Anderson, and Swing 2009; Ferguson and Kilburn 2009). Prosocial behavior, which includes empathy and the helping or rewarding of others, has also been shown to decrease with exposure to violent video games (Bushman and Anderson 2009; Funk et al. 2004). Meta-analytic reviews of studies have continued to show that regardless of the design of the research (experimental, cross-sectional, or longitudinal), it is possible to correlate video game violence exposure to aggressive behavior, hostile affect, psychological arousal, and decreases in prosocial behavior (APA Task Force on Violent Media 2015; Anderson 2004; Anderson et al. 2010).

Partly in response to the psychological effects literature, as well as to the intense media pressure resulting from reports of violent video games leading to violent actions, the video game industry's Entertainment Software Ratings Board (ESRB) has a rating system for violent content, similar to that of the movie industry, by which violent content is reviewed and rated. North America, Europe, Japan, Australia, the United Kingdom, and Finland have ratings systems in place (e.g., the Pan European Game Information [PEGI] system) to make consumers aware of violent content and to indicate the age group for which the game is appropriate.

Complicating any attempt to demarcate and rate media by reference to their levels and kinds of violence, however understandable its appeal, is the very meaning of *violence*, when its referent is a programmed play mechanic. No less troubling is the real/play distinction, illustrated by Bateson's "nip" versus "bite" distinction and Johan Huizinga's "magic circle," that always inadequately seeks to demarcate "real violence" from "just playing." And not all ways of playing with "violence" are the same: the ways player agency is implicated and involved in (virtual) violent behaviors in games within the horror genre, which has more than its share of video game violence, may be positioned in opposition to (game) violence, playing not for the sake of engaging in violence but rather playing defensively, protectively, or self-protectively (Perron 2009). The appeal of such unabashedly violent games are the feelings of suspense, anticipation, dread, shock, and terror that such games are more or less ingenious at inducing in their players.

So although effects researchers are well able to show positive correlations (especially related to aggression) and to reproduce their findings, the difficulty in this approach to the question seems not to be reproducibility but deep unreliability at the level of context: what is the relationship between experimental context and aggressive behavior in the world writ large? Media scholars and socioculturalists insist that linking violent video game play to real-world dispositions, behavioral outcomes, and antisocial actions misses the wider sociocultural context in which video games are played (Jenkins 2006; Tappan and Kita 1999). These counterarguments to psychological studies that reproduce violent effects in their research participants are not research based but instead contribute a crucially important theoretical consideration to these debates: what do we really know about the relationships between (sometimes) violent content in video games and the larger meanings both adults and children make in relation to that content?

This theoretical position views the psychological effects literature as abstracting the question from its larger situation, simplifying it, at times, beyond any usefulness in terms of individual meaning-making. The "meanings not effects" model asks the question of a wider range of distributed and dispersed, networked sociocultural actions and events. This position does not discount the psychological effects literature but rather asks how it can disambiguate simulated aggression and player excitation from the larger sociocultural complexities of everyday life, a question that has not yet, however, stimulated the research needed to persuade those for whom a compelling, if simplistic, causal model has the final word.

Violence sells in all media, and video games are no exception, although many best-selling games (such as *Pac-Man* [1980], *Super Mario Bros.* [1985], *Myst* [1993], *The Sims* [2000], and Wii *Sports* [2006]) are relatively nonviolent games. Whether and how playing violent video games over time in a context of media and cultural violence can be disambiguated from that context remains, "effects" research notwithstanding, very much open to debate.

Jennifer Jenson and Suzanne de Castell

See also: Censorship

Further Reading

Anderson, C. A. "An Update on the Effects of Playing Violent Video Games." *Journal of Adolescence* 27 (2004): 113–122.

Anderson, C. A., L. Berkowitz, E. Donnerstein, L. R. Huesmann, J. Johnson, D. Linz, and E. Wartella. "The Influence of Media Violence on Youth." *Psychological Science in the Public Interest* 4 (2003): 81–110.

Anderson, C. A., and B. J. Bushman. "Effects of Violent Video Games on Aggressive Behavior, Aggressive Cognition, Aggressive Affect, Physiological Arousal, and Prosocial Behavior: A Meta-Analytic Review of the Scientific Literature." *Psychological Science* 12 (2001): 353–359.

Anderson, C. A., N. L. Carnagey, M. Flanagan, A. J. Benjamin, J. Eubanks, and J.

C. Valentine. “Violent Video Games: Specific Effects of Violent Content on Aggressive Thoughts and Behavior.” *Advances in Experimental Social Psychology* 36 (2004): 199–249.

Anderson, C. A., D. A. Gentile, and K. E. Buckley. *Violent Video Game Effects on Children and Adolescents: Theory, Research, and Public Policy*. Oxford, UK: Oxford University Press, 2007.

Anderson, C. A., A. Shibuya, N. Ihori, E. L. Swing, B. J. Bushman, A. Sakamoto, H. R. Rothstein, and M. Saleem. “Violent Video Game Effects on Aggression, Empathy, and Prosocial Behavior in Eastern and Western Countries: A Meta-Analytic Review.” *American Psychological Association* 136, no. 2 (2010): 151–173.

APA Task Force on Violent Media. “Technical Report on the Review of the Violent Video Game Literature.” Washington, DC: American Psychological Association, 2015. Available at http://www.apa.org/pi/families/violent-media.aspx.

Barlett, C. P., C. A. Anderson, and E. L. Swing. “Video Game Effects: Confirmed, Suspected, and Speculative.” *Simulation & Gaming* 40, no. 3 (2009): 377–403.

Bartholow, B. D., B. J. Bushman, and M. A. Sestir. “Chronic Violent Video Game Exposure and Desensitization to Violence: Behavioral and Event-Related Brain Potential Data.” *Journal of Experimental Social Psychology* 42 (2006): 532–539.

Bushman, B. J., and C. A. Anderson. “Comfortably Numb: Desensitizing Effects of Violent Media on Helping Others.” *Psychological Science* 20 (2009): 273–277.

Ferguson, C. J., and J. Kilburn. “The Public Health Risks of Media Violence: A Meta-Analytic Review.” *Journal of Pediatrics* 154, no. 5 (2009): 759–763. Available at https://doi.org/10.1016/j.jpeds.2008.11.033.

Funk, J. B., H. B. Baldacci, T. Pasold, and J. Baumgardner. “Violence Exposure in Real-Life, Video Games, Television, Movies, and the Internet: Is There Desensitization?” *Journal of Adolescence* 27 (2004): 23–39.

Jenkins, Henry. *Fans, Bloggers, and Gamers: Exploring Participatory Culture*. New York: New York University Press, 2006.

Perron, Bernard. *Horror Video Games: Essays on the Fusion of Fear and Play*. Jefferson, NC: McFarland, 2009.

Scutti, S. “Do Video Games Lead to Violence?” CNN, February 22, 2018. Available at https://www.cnn.com/2016/07/25/health/video-games-and-violence/index.html.

Tappan, M., and B. Kita. “The Columbine Tragedy: A Sociocultural Perspective.” Annual Meeting of Moral Education, Minneapolis, Minnesota, 1999. Available at https://web.archive.org/web/20160110101211/http://www.colby.edu/education/courses/ed318/AME1199.html.

Weber, R., U. Ritterfeld, and K. Mathiak. “Does Playing Violent Video Games Induce Aggression? Empirical Evidence of a Functional Magnetic Resonance Imaging Study.” *Media Psychology* 8 (2006): 39–60.

Virtual Boy. *See* Nintendo Virtual Boy

Virtual Pets

Virtual pet games began as a philosophical question: how can a computer program simulate a life-form? One of the most famous examples of these experiments is *John Conway's Game of Life* (1970). Simulating life on a grid, individual cells reproduce and die according to four simple rules. These parameters gave birth to various strategies, including cells capable of motion and endless reproduction.

Commercial virtual pets focus less on philosophical questions and more on resource management. Typically, they entail the maintenance of charismatic virtual fauna based on real or imaginary animals. The first widely commercially successful virtual pets for the personal computer were produced by PF Magic in 1995. The *Petz* series, made up of *Dogz* (1995) and *Catz* (1995), featured stylized cartoon animals that play with toys, eat, and can learn tricks through positive and negative reinforcement. However, excessive use of negative reinforcement or general neglect would eventually cause the pet to run away. Later games introduced the option to breed your furry companions, producing offspring with randomly assigned characteristics from the mother and father.

The first mobile pet games were little more than computerized key chains. *Tamagotchi* emerged in Japan in 1996 and worldwide in 1997, sparking one of the biggest toy fads of the 1990s. The game consists of a tiny "tama-go" board, a microcontroller, a small four-tone gray LCD screen, and an audio DAC packaged in an egg-shaped plastic case (Silvanovich 2013). Players were tasked with feeding and cleaning up after their pets, while also playing games to boost in-game metrics such as happiness. *Tamagotchi* and their subsequent rival, *Digimon* (1997), responded to care by undergoing different phases of development or evolution. The forms they took were often determined by the quality of care the player provided. Unlike *Tamagotchi*, *Digimon* offered player-to-player battles, with the most powerful adult Digimon forms reserved for players who provided the best care. Although these pets appear alive, most of their properties are preprogrammed and thus not truly emergent.

Artificial pet games do not really offer a challenge or a victory condition and may be better categorized as a software toy rather than a game. Will Wright, the creator of *Sim City* (1989), coined the term to describe the entertainment provided by a computer program that does not offer a win state or even an ending. The entertainment from a digital pet comes less from gameplay and more from the affective relationship the player builds with his or her pet. According to psychologist Sherry Turkle, one should not dismiss the relationships players develop with their pets as silly or delusional (Turkle 2017). Loving relationships emerge over time, involving imaginative empathy and learning to savor the rough patches and surprises. Whether these surprises come from a living entity or a computer program is immaterial; while the life-form is simulated, the love felt by the player is real.

The *Tamagotchi* from Japan was a toy fad of the late 1990s. (Moon Cat/Dreamstime.com)

Colin Wheeler

See also: Simulation Games

Further Reading

Schneider, Peer. "GDC 2005: Iwata Keynote Transcript." IGN, March 11, 2005. Available at https://www.ign.com/articles/2005/03/11/gdc-2005-iwata-keynote-transcript.

Silvanovich, Natalie. "Many More Tamagotchis Were Harmed in the Making of This Presentation." *Recon*, June 28, 2013. Available at https://infocondb.org/conrecon/recon-2013/many-more-tamagotchis-were-harmed-in-the-making-of-this-presentation.

Turkle, Sherry. *Alone Together: Why We Expect More from Technology and Less from Each Other*. New York: Basic Books, 2017.

Virtual Reality (VR)

The term *virtual reality* (VR) is often defined according to the context in which it is used. To an artist, *virtual reality* may have a different connotation than it would for a fiction writer or a computer scientist. However, in the case of video games, the term most notably refers to the use of computer-based simulations to create a perceived experience in real or fantasy worlds.

Some video game enthusiasts suggest that every electronic game is an instance of a virtual reality. Others focus on the creation of games in virtual worlds. For instance, a video game designer might create a game that others could play inside of a simulated world like *Second Life* (2003). Still others might define VR games as those that include haptics, or the use of objects and devices that let users participate more intuitively with games. Examples would include playing a guitar in a real band, as in *Rock Band* (2007); using the controller to swing a golf club, as in *Wii Sports* (2006); or using a controller to dance, as in *Dance Dance Revolution* (1998). Perhaps the most recent and pervasive use of VR with video games relates to the use of hardware or software to produce three-dimensional gaming interactions (Shelstad, Smith, and Chaparro 2017) in games such as *Beat Saber* (2018) with headsets like the Oculus Quest (2019).

Michael Heim (1993) lists various characteristics of virtual reality, but interaction, immersion, and artificiality are some of the key concepts associated with VR. Ferdig, Gandolfi, and Immel (2018) also highlighted words such as *fidelity* and *presence*. *Virtual reality* is often used interchangeably with terms such as *immersive virtual environments*, *immersive virtual reality*, *augmented reality* (AR), *simulated reality*, and *interactive three-dimensional worlds*. However, there are differences that exist between each of these words; authors who use the term necessarily provide additional qualifications to their definitions as they introduce their topics.

Given its various definitions, there is some debate as to when the term first appeared. Many attribute it to the French playwright Antonin Artaud. Antonin first used the term in his book *The Theatre and Its Double* (1938). Myron Krueger is also credited for using the term "artificial reality" in his creation of *VIDEOPLACE*

(1970). However, the concept attained significant attention in the late 1980s and early1990s, in part due to Jaron Lanier, who founded VPL, the first company that sold VR products (http://www.jaronlanier.com). Credit for its rise in popularity is also attributed to Howard Rheingold's book *Virtual Reality* (1991).

Early work in VR often centered on hardware. Developers created body suits, head-mounted displays (HMDs), and CAVEs (Cave Automatic Virtual Environment) in which participants would interact with virtual worlds or virtual objects. This was due, in part, to the high technological demands of virtual environments. There were a few VR video games developed at this time, such as *Dactyl Nightmare* (1991), *Virtual Combat* (1993), and *Dactyl Nightmare 2* (1994). However, the cost of head-mounted displays and an attendant to run the game led to a cost of $4 for four minutes of gameplay, so the game never went much beyond a novelty. With the advent of faster processing speeds, smaller-sized storage devices with increased capacity, and innovative programming, the focus on virtual environments now concentrates on software as well. Researchers and inventors still focus on hardware, such as stereoscopic 3-D; however, development software such as OpenSimulator (2007) and OGRE (2005) as well as synchronous environments such as *Active Worlds* (1995) and *Second Life* (2003) helped redefine VR as a software-based experience. Today, affordable VR systems are appearing commercially, such as the Oculus Go and the HTC Vive, making VR a viable platform for games.

VR applications are used widely in experiences that range from education to health care to military training; for instance, flight simulators are used to train pilots. VR applications are also being used to cure people's fear of heights (Rothbaum et al. 1995), train surgeons (Seymour et al. 2002), explore mock crime scenarios (Mertens and Allen 2008), and treat balance and depression for stroke patients (bin Song and cho Park 2015). New explorations into VR games are investigating the exploration of gaming environments with sound, smell, and touch.

Richard E. Ferdig and Mark J. P. Wolf

See also: Augmented Reality; HTC Vive; Oculus Rift

Further Reading

bin Song, Gui, and Eun cho Park. "Effect of Virtual Reality Games on Stroke Patients' Balance, Gait, Depression, and Interpersonal Relationships." *Journal of Physical Therapy Science* 27, no. 7 (2015): 2057–2060.

Ebersole, S. "A Brief History of Virtual Reality and Its Social Applications." 1997. Available at https://www.academia.edu/629431/A_brief_history_of_virtual_reality_and_its_social_applications.

Ferdig, Richard E., E. Gandolfi, and Z. Immel. "Educational Opportunities for Immersive Virtual Reality." In *Second Handbook of Information Technology in Primary and Secondary Education*, edited by J. Voogt, G. Knezek, R. Christense, and K. W. Lai, 955–966. New York: Springer International Handbooks of Education, 2018.

Heim, Michael R. *The Metaphysics of Virtual Reality*. Oxford, UK: Oxford University

Press, 1993.

Krueger, M. W., T. Gionfriddo, and K. Hinrichsen. "*VIDEOPLACE*—An Artificial Reality." *ACM SIGCHI Bulletin* 16, no. 4 (1985): 35–40.

Mertens, R., and J. J. Allen. "The Role of Psychophysiology in Forensic Assessments: Deception Detection, ERPs, and Virtual Reality Mock Crime Scenarios." *Psychophysiology* 45 (2008): 286–298.

Rheingold, Howard. *Virtual Reality*. New York: Summit Books, Simon & Schuster, 1991.

Rothbaum, B. O., L. F. Hodges, R. Kooper, D. Opdyke, J. S. Williford, and M. North. "Effectiveness of Computer-Generated (Virtual Reality) Graded Exposure in the Treatment of Acrophobia." *American Journal of Psychiatry* 152 (1995): 626–628.

Seymour, N. E., A. G. Gallagher, S. A. Roman, M. K. O'Brien, V. K. Bansal, D. K. Andersen, and R. M. Satava. "Virtual Reality Training Improves Operating Room Performance: Results of a Randomized, Double-Blinded Study." *Annals of Surgery* 236, no. 4 (2002): 458–464.

Shelstad, W. J., D. C. Smith, and B. S. Chaparro. "Gaming on the Rift: How Virtual Reality Affects Game User Satisfaction." *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* 61, no. 1 (September 2017): 2072–2076. Los Angeles: Sage.

Visual Literacy

Visual literacy is the ability to critically consider, analyze, and judge the value of visual information such as pictures, graphs, images, illustrations, and videos. The concept, originally coined by John Debes in 1969, was then defined as "a group of vision-competencies a human being can develop by seeing and at the same time having and integrating other sensory experiences" (Avgerinou and Ericson 1997, 280). Explicit strategies may be taught to help increase awareness of how to interact with various types of visual data. Previously, educators have mainly focused on teaching individuals how to interact with textual data. To develop text-based literacy, individuals are taught the conventions of how to read and engage with the written word. As text-based data evolves into more multimodal presentations of information, current trends stress the additional importance of considering the value, source, and authenticity of the visual information with which we are presented.

There are commonalities between text-based literacy and visual literacy and general rules to follow depending on the interaction type. For instance, written languages such as Hebrew and Arabic are read from right to left, whereas Germanic languages are read from left to right. Punctuation informs the reader in terms of prosody, offering cues such as when to pause or break. These conventions are taught, accepted, and followed when interacting with respective texts to help the reader capture the author's intended meaning.

Compounding on text-based rules, additional considerations apply when interacting with visually rich media such as comics and graphic novels, popular forms of entertainment coupling text with illustrations and images to deliver story content. A reader engaged with such a text should adhere to the previously mentioned rules of text while considering additional ones regarding imagery—namely interacting with image panes from left to right and from top to bottom. This process is similar to the textual conventions of interacting with Germanic and Romance texts; however, image panes may be presented in an infinite array of artistic formats. For example, many Japanese manga (oversimplified in English to mean "comics") are read from right to left. Awareness of these differences and interaction protocols is critical, and knowledge of how to interact with image-rich media can help maximize what the reader takes away from the story.

In addition to comics and graphic novels, other visually rich media, including painting, photography, film, television, video games, and the World Wide Web, are important in modern culture. One popular method critics have used to teach about and discuss art with a common vernacular is known as the Feldman Method. For more than fifty years, this four-step process has encouraged individuals to *describe*, *analyze*, *interpret*, and *judge* works of art with which they may interact. Applying this type of concrete methodology to an abstract concept such as evaluating art has provided for rich discussions and appreciation of visual media.

The other forms of aforementioned media also stress the value of visual literacy as they are globally ubiquitous and insatiably consumed. Persons savvy in visual literacy skills are more able to navigate and process the data transmitted by these sources. There was a time when the printed word was viewed as irrefutable fact; however, the advent of the printing press and the more recent segue to current technologies, such as Web 2.0 self-publishing, have made people more critical of the information they consume. Likewise, pictures and videos were once considered examples of undeniable truth, yet this trend has also changed and continues in flux given the ability and relative ease with which we can manipulate visual imagery. For instance, Adobe Photoshop is arguably the industry standard software application for editing visual content; referring to an image as "Photoshopped" is common vernacular, suggesting an image is a fake or has been edited or altered. There are internet sites and online communities centered on fostering the exploration of and continuing the discussion about image editing and manipulation. These groups are now expanding to include deepfake content (i.e., the artificial intelligence-based superimposing of images over video), as supporting technologies are becoming cheaper and more easily accessible. As such, users must not only critically reflect on the authenticity and value of static images but multimodal content such as videos and animated GIFs also require thoughtful and thorough analysis.

One need look no further than the supermarket checkout lane or local bookstore for examples of magazine covers rife with altered images and unrealistic presentations of the human form, possibly raising issues of self-esteem or negative self-image for individuals with poor visual literacy skills. To complicate matters even more, the meaning of an image may also change based on the context or setting in which it is used, even if the original image remains unaltered. As highlighted by Richard Dawkins's concept of the *meme*, a sort of cultural gene, the use of images or visual data may have an impact on our perceptions of their meaning. Websites such as 4chan, Reddit, and Imgur are hotbeds of memes in action, as users develop, alter, and share personalized interpretations of static images and animated GIFs. These communities have created internet sensations such as LOLcats, Rickrolling, and countless others. The rise of mobile technologies and their ubiquitous nature allow images to go viral at breakneck pace, further feeding the cycle of content creation, dissemination, consumption, and remixing, thus introducing new content and starting the process over again.

Of perhaps greatest interest and import in terms of visual literacy application is the synthesis of text- and image-based evaluation methodologies, protocols, and rules in relation to video game technologies. Borrowing much from conventional literacy theory, film and television theory, art appreciation, and the interpretation of comics and graphic novels, video games are an art form of their own unique accord. Even in their simplest forms, video games introduced new reading requirements, for example, the need to identify and locate the graphical representation of the avatar controlled by the player (see Reading Video Game Imagery). Akin to theories of art critique and evaluation, the appreciation of imagery and importance of quality graphics relies heavily on subjective factors; some users may prefer realism, and others may be drawn to more stylized graphics. Finally, artistic presentation of video game technologies may find users needing to draw from comic book or graphic novel conventions in terms of following stories presented through storyboards or other types of story panels.

However, gameplay often requires that one must possess skills and knowledge known only to those who interact within gaming or virtual worlds. Given the dynamic nature of these environments, there are skills of visual literacy that either must be learned or experienced to truly appreciate them. There are clearly qualities and factors of *je ne sais quoi* at play that future research may help better define, but the process is as complex as positing what makes someone a great athlete or musician. For example, what issues of visual literacy are at play that allow gaming phenoms such as Tyler “Ninja” Blevins to excel at games like *Fortnite* (2017) to the point of earning millions of dollars through streaming play sessions?

Being able to separate fact from fiction in visually rich media environments is necessary given their prevalence in modern society and the general lack of content policing conducted by various media outlets. The consumer becomes the ultimate judge of what is worthwhile and what is not in the realm of visual literacy, and the analysis and evaluation of visual elements is a deliberate and explicit process. Intelligence in all areas of information consumption is critical in postmillennial society. Given our ties to, dependence on, and general saturation of visual data in modern culture, visual literacy is equally (if not more) important as textual literacy. As more and more mobile media devices permeate our culture and daily lives, visual literacy skills will increase in importance, making the end user the ultimate judge of credibility and merit in regard to content. Acknowledging the importance of visual literacy and fostering its development are critical discussions, we must continue having these discussions as our daily lives continue to be inundated with visual media.

Joseph C. DiPietro

See also: Reading Video Game Imagery

Further Reading

Avgerinou, M., and J. Ericson. "A Review of the Concept of Visual Literacy." *British Journal of Educational Technology* 28, no. 4 (1997): 280–291.

Feldman, E. *Practical Art Criticism*. Englewood Cliffs, NJ: Prentice Hall, 1994.

Frey, N., and B. Fisher. *Teaching Visual Literacy: Using Comic Books, Graphic Novels, Animé, Cartoons, and More to Develop Comprehension and Thinking Skills*. Thousand Oaks, CA: Corwin Press, 2008.

Joel & Irene Benedict Visual Literacy Collection, hosted by Arizona State University. Accessed October 3, 2020. Available at http://www.asu.edu/lib/archives/benedict/index.html.

Lidwell, W., K. Holden, and J. Butler. *Universal Principles of Design, Revised and Updated: 125 Ways to Enhance Usability, Influence Perception, Increase Appeal, Make Better Design Decisions, and Teach through Design*. Beverly, MA: Rockport, 2010.

McCloud, Scott. *Understanding Comics: The Invisible Art*. New York: Harper, 1994.

Visual Novels

The term *visual novel* encompasses a range of games that would be considered as different categories in Japan, as it is not regarded as a genre per se but could rather be described as sharing the same novel game system. It could be argued, however, that these games do share enough similar aesthetic and gameplay elements to warrant their grouping underneath the same label, though their ludic experiences do differ. In their current form, these games can be considered as a remediation of the novel format. Although they are text heavy, they equally rely on image and sound, such as soundtrack and voice acting, to convey the proper atmosphere and to highlight the narrative tensions. The player must "read" and sporadically choose one of the few narrative options presented. Such games often feature a branching narrative structure, and each choice has the potential to take the story in a new direction. Therefore, the player's enjoyment of these games is not limited to experience of a single story but rather the sum of different versions of possible stories (Azuma 2009).

Replaying the game is thus part of the core mechanic of these games, and certain titles will even display (part of) their full narrative architecture, such as the flowchart system used by Chunsoft's *Zero Escape: Virtue's Last Reward* (2012), or at least their possible endings to give the player an incentive to pursue new choice combinations. Although this multiple ending system rewards the player with a satisfactory end, most of these games nowadays have a "true" ending. This requires that the player view all prior endings (or branches), as this provides the last pieces to resolve the overarching plot.

Visually, these games use a particular cartography of the image, involving the use of image banks and dialogue boxes. These games have relied on pre-rendered pictures that can be combined and swapped in sync with the mood and scene described: some background is used to give the action a context, and a character's portrait can alternate between different sets of clothes, facial expressions, and poses. The story will mostly be told through the use of dialogue, which will be usually be confined to boxes limited to one-third of the screen. When more than two characters are present, the displayed portrait may change to reflect the active speaker. The game may also rely on name indication and on a color-coded system to facilitate quick identification of the speaker. The protagonist, who also serves as the in-game stand-in for the player, is rarely depicted on screen, as these games utilize a first-person point of view: the player character's thoughts, voice, and actions are merely conveyed through text rather than through a voice actor. The occasional exceptions are the cover art of the game and the use of computer graphics (CG), which may switch to a third-person view.

Adobenchā gēmu, which can be translated as "adventure game" (not to be confused with the adventure game genre), incorporates more ludic phases as a plot device meant to slow the progression of the player, usually under the guise of puzzles.

Ren'ai gēmu, which can be translated as "love simulation game," or dating sims, will always be centered on dating and romance. They may add new interactions, but their finality will irremediably be oriented toward the pursuit of a romantic partner.

Laurie-Mei Ross Dionne

See also: Dating Sims; Remediation

Further Reading

Azuma, Hiroki. *Otaku: Japan's Database Animals*. Translated by Jonathan E. Abel and Shion Kono. Minneapolis: University of Minnesota Press, 2009.

Van der Geest, Dennis. "The Role of Visual Novels as a Narrative Medium." Master's thesis. Leiden, Germany: University of Leiden, 2015.

VR. *See* Virtual Reality

W

Walden, a Game

USC Game Innovation Lab's *Walden, a Game* (2017), a simulation and exploratory narrative game about Henry David Thoreau's time at Walden Pond in 1845, was one of the first games supported by the National Education Association (NEA) and the National Endowment for the Humanities (NEH) under their media arts and digital projects for the public programs, respectively. As an experimental game research project, the game was produced and published by the University of Southern California's Game Innovation Lab as part of a decade-long development process.

The game world is a deeply researched recreation of the pond and surrounding area, based on Thoreau's own surveys, period maps, writings, and journals. The world and its natural objects, including twelve thousand plants, trees, and animals, are part of a dynamic simulation that changes over the eight half-seasons of the in-game year. The player must learn how to live in the woods as plants and berries go in and out of season and as various resources become plentiful or scarce during the course of the year. The game arc, which takes about six hours to play, is based loosely on the structure of the book *Walden; or, Life in the Woods* (1854), which focuses on Thoreau's first year of his two-year stay in the woods.

The narrative elements of the game are found by exploring the nearby town of Concord, Emerson's home, and Thoreau's cabin and by taking on quests that reveal both social and personal contexts for Thoreau's experiment, which took place when new technologies such as the railroad and telegraph were speeding up the pace of life and there was growing tension in the United States around slavery and expansionism. The details of this backstory were created in collaboration with Thoreau scholars and curators, and the game contains edited material from sources that include the letters and journals of Thoreau, Ralph Waldo Emerson, Horace Greeley, Margaret Fuller, Nathaniel Hawthorne, Louis Agassiz, and other contemporaries of Thoreau.

The game is unusual in its design, as the expected *survival* mechanics, such as maintaining food, fuel, shelter, and clothing, are balanced by a set of less expected *inspiration* mechanics, which are generally more passive in nature and include listening to sounds in the distance, reading books found in the forest, interacting with animals, and meditating at special places of solitude deep in the woods. While the player can choose to upgrade the cabin or tools by working odd jobs and purchasing items such as a fancy fishing rod or iron stove at general store, the real object of the game is to find a balance between how much emphasis is placed on these material needs and how much is placed on attention to the more spiritual needs of the inspiration mechanics. Finding that balance is not a onetime thing but must be practiced throughout the game as the challenge of the changing seasons increases the emphasis on the material needs.

The characters in the game are voiced by a cast of actors, including Emile Hirsch as Henry David Thoreau, Jim Cummings as Ralph Waldo Emerson, and Misty Lee as Sophia Thoreau. The game was released for Windows PC and Mac OSX on July 4, 2017, which was the date in 1845 when Thoreau began his experiment in living at the woods. A PlayStation 4 release followed in May 2018. A companion curriculum supporting the use of the game in classrooms was released by Journeys in Film in December of 2017.

Tracy Fullerton

See also: Fullerton, Tracy; *Night Journey, The*

Further Reading

Toppo, Greg. *The Game Believes in You: How Digital Play Can Make Our Kids Smarter*. New York: St. Martin's Press, 2015.

Walkthroughs

A video game walkthrough tells a player, in detail, how to complete a game. This usually consists of directions on how to progress that can include movements (which way to turn, what door to open, etc.); solutions to puzzles needed to continue forward, locations of crucial objects or areas, and revelations of traps, enemies, or other obstacles that will impede the player. At its core, a walkthrough is mostly concerned with forward progress, guiding a player through the game world or narrative threads that need to be pursued to reach the end of the game. Other elements are often included within a game walkthrough: tactics to combat enemies, instructions on how to improve a player's character, or statistics for a piece of game equipment can appear. These elements can be extracted from a walkthrough section without compromising its utility, although they will regularly have separate sections earlier in a game guide.

Walkthroughs can follow a critical path or cover every possible event and location in a video game (the 100% walkthrough). A critical path walkthrough focuses on the most direct way to get to the end of a game. It will eschew side quests, noncritical areas, or any other aspect of the game that is unnecessary to simply reach the end. A complete, or 100 percent, walkthrough will cover every secret and location, even those that are not essential to finishing the game. A complete walkthrough is an effort to ensure that a player knows every aspect of the game world. Many video games have multiple end scenarios that are revealed depending on the actions of a player (e.g., the order in which they are taken or the manner in which encounters are dealt with). A critical path walkthrough will usually only address a single ending, whereas a 100 percent walkthrough reveals the different prerequisites for different end scenarios.

A video game with a linear progression (such as those of the *Halo* series) has less need of a walkthrough than games with worlds that can be freely explored, such as *Borderlands* (2009) or those of the *Grand Theft Auto* series. A linear game has few choices for the player to make, and the path forward is the only one available; consequently, a walkthrough for such a game is mostly useful for revealing what challenges lie ahead for the player. How many and what type of opponents are in the next area, for instance, is of much greater interest than where to find that next area.

Players in an open-world (or "sandbox") game will be served well by a walkthrough that details the interactions that await them in the various locations available as well as what opponents they may face. This information can be accompanied by suggestions as to what order to attempt these interactions (especially if it is a critical path walkthrough), although the structure of the game may be such that the order bears little consequence on the overall gameplay.

It is difficult to track down the first publication of a walkthrough for a video game, but the walkthrough was undoubtedly pioneered in one of the early video game magazines. A likely candidate is *Computer Gaming World* (*CGW*), which appeared in 1981 and was geared toward PC games, changing its name to *Games for Windows* in 2006 before stopping its printed format in 2008.

In the first issue of *CGW* there is a review/guide for the game *B-1 Nuclear Bomber* (1980), a two-page article that includes tips for not only how to play but also how to reprogram the game to make it harder. The second page provides a map to help players plan better routes to targets. Although extremely basic, this can be considered an early walkthrough with its information provided to help a player succeed more efficiently.

A more explicit example of an early walkthrough is the first issue of *Nintendo Power* magazine, published in 1988. The pages include a game guide to *Super Mario Bros. 2* (1988) for the Nintendo Entertainment System (NES) that is almost indistinguishable from its modern counterparts. Maps, moves, items, enemies, tips, and secrets are all included in a very visual format akin to the strategy guides that came after it. The same issue also details the "second quest" of *The Legend of Zelda* (1986), a harder version of the game that is available after beating the game once. Again, there are maps and walkthrough information to guide a player through the game areas, and it points out problem areas and routes as well as where to pick up various items.

With the advent of published strategy guides dedicated to single video games, walkthroughs became more robust. As games have become more complex, walkthroughs have had to keep pace. The open-world game *Fallout: New Vegas* (2010) has a game guide published by Prima Games that is 448 pages long and covers in detail every one of the game's hundreds of missions and unique locations.

Mario De Govia

See also: Speedruns

Further Reading

Cummings, Chris. "B-1 Nuclear Bomber: A Strategic Map." *Computer Gaming World* 1, no. 1 (November–December 1981): 18–19. Available at http://pdf.textfiles.com/zines/CGW/1981_1112_issue1.pdf.

Hodgson, David. *Fallout: New Vegas: Prima Official Game Guide*. Roseville, CA: Prima Games, 2010.

War

War is a conflict between at least two groups that is carried out through violence. The conflict aids the groups in solving, clearing, or overcoming differences between them. The measures of violence employed are of nonsymbolic nature and are targeted at the individuals of the group conceptualized as the enemy. Because war as a form of action and its narrative is so substantially interwoven with subject, society, and politics, it is natural that reflections on and interpretations of culture are closely connected to the discussion of war. Thus, the history of games in a broader sense is permeated by a metaphorical or comprehensive discussion of war, and it is moot to consider whether the competitive nature and the oppositional principle of a game reproduces the martial structure or whether the opposite is true and the principle of playful dispute in competitive games culturally and historically preceded martial conflict.

In this sense, many of the oldest known board games (such as Wéquí, Go, Senet, Mehen, the Royal Game of Ur, and, of course, chess) must be interpreted ambivalently. They may be seen as abstract exercises with the goal of building personality, in which the playing subject trains his abilities in anticipatory and planning actions in a situation of competitive character in which two parties acting opposite to one another are in the center of the game metaphor. This conceptualization of games historically leads to a modern understanding of video games. Their ability to represent and simulate as well as their often narrative settings refer back to the concept of an abstract, symbolic, and binary opposition. At the same time, all games may also be seen as abstract models of martial actions, in which tactical, strategic, and operational knowledge is chosen or simulated.

In many traditional and mythological tales (as well as in video games), war functions as a form of dispute: war is seen as a cosmic, archetypal, or natural principle of the different, oppositional, and antagonistic. In contrast, there are positions that see war as a disruption of natural harmony; it is an unnatural, abnormal condition of society and subjects. Consequently, one's view of war is highly dependent on a general perspective of world order—is war a natural condition (according to Thomas Hobbes) or is peace (according to John Locke)? A change of perspective consequently shows that war is not a condition of the subject and its community but rather an operational condition that is part of policies of control and order (according to Jean Jacques Rousseau).

One change in the conceptualization of both war and games is connected to the beginning of the Enlightenment. Because of the beginning of *rationalization*, the perspective on war also changed. One significant position is that of Carl von Clausewitz, who reasons that war is no longer based on natural law or an atavistic cultural formation that culturally shapes humans. From Clausewitz's perspective, war cannot be seen as detached from (national and state) politics. Here, war is conceptualized as a political and rational act of violence in which one's own political will is forced on the opponent, at the same time recognizing that the opponent is fighting with the same motivation. The decisive point in this rationalization of war is the change from the *art of war* to the *science of war*. Here, warfare is changed into a rationally operated, postheroic, rule-governed, and functionally logical practice. As a consequence, the conceptualization of the game also changes. Games are seen more and more as arenas of action within which postulates of the science of war can be reproduced or internalized as didactical trial actions. In video games, we can find both of these conceptualizations: at the level of narration, there are often *mythological* as well as *rational* conceptualizations; on the level of the program, game mechanics, or the algorithm, war is a scientific, rule-based, and knowledge-based series of events happening in the tradition of the board games and war simulations of the early seventeenth and eighteenth centuries.

The most well-known examples (apart from the reevaluation of chess in European cultural history) are the war board games that were developed in the mid-seventeenth century. Early examples are Georg Venturis's 1797 *Regeln für ein Neues Kriegsspiel für den Gebrauch an Militäranstalten* (*Rules for a New War Game to Be used at Military Facilities*) and the game by Johann Christian Ludwig Hellwig, *Versuch eines aufs Schachspiel gebaueten taktischen Spiels von zwey und mehreren Personen zu spielen* (*Attempt at a Tactical Game for Two and More Persons, Based on Chess* [1780]). Although these games were based heavily on chess and relied on the playful internalization of military scientific paradigms during training, they were followed by a transformation from chess to war simulations as seen in the war board game developed by Leopold Georg Baron von Reiswitz and his son Georg Heinrich Leopold Freiherr von Reiswitz, *Anleitung zu einer Mechanischen Vorrichtung um taktische Manoeuvres sinnlich darzustellen* (*Instructions for a Mechanical Device to Portray Tactical Maneuvers Sensually* [1812–24). These games not only successively integrate coincidence and probability into their simulation of war, but they also increase the complexity of the rules and the degree of detail in the reproduction, add limitations to the visibility of the opponent's lineup and movements, and encourage the flexible reproduction of real scenarios. More important, these games need to be interpreted as scientific and rational didactic model areas of the new science of war.

This trend grew in the nineteenth century. War board games increasingly lost their playful or didactic character and more and more became simulations with reference to the real world. In Europe, wargames were employed in the logistical and strategic planning of actual wars, for example, during the Franco-German War of 1870–71 as well as in preparation for World Wars I and II. These simulations were also the predecessors of today's tabletop games, wargames made of tin soldiers, model landscapes, and differentiated rules. One of the well-known examples of this trend is the "Floor Game" by H. G. Wells, to be played with figurines in a model landscape with spring breechloader guns: "This further removes the game from the chess category, and approximates it to the likeness of active service" (Wells 1913, 25).

From the mid-tenth century until World War II, another surge of rationalization unleashed a fresh differentiation and increase in the complexity of so-called conflict simulations (cosims). Driven by the development of computers, the establishment of a mathematically founded game theory, the expansion of the strategic-tactical-operational war paradigm with logistical and economical functions (operation research), and more complex decision models (e.g., by cybernetics), wargames became informative, dynamic simulations of possibilities. This development can also be seen in the civil sector. Fed by strategic board games (e.g., Charles S. Roberts's *Tactics* [1954]) or pen-and-paper role-playing games (e.g., Gary Gygax and Dave Arneson's Dungeons & Dragons [1974]), different computer game genres were developed.

In video games, the strategy game genre was present early on and follows the tradition of the wargame (e.g., Chris Crawford's *Tanktics* [1978]). Together with the tactical shooting game genre that arose during the 1990s, they exemplify the merging of science and war as theorized by Clausewitz and Edward Luttwak. They portray strategic (strategy games) and operational (development simulations) as well as tactical (tactical shooting games) types of action. Yet, the portrayal of war in video games is more than an extension of the science of war model areas. As wargames are also narratives with cultural interpretations, it is not surprising that they use war as mythical narratives beyond concrete or operational functions.

Rolf F. Nohr

See also: World War II in Video Games

Further Reading

Allen, T. B. *War Games: Inside the Secret World of the Men Who Play at Annihilation*. New York: McGraw-Hill, 1987.

Bell, R. C. *Board and Table Games from Many Civilizations*. Mineola, NY: Dover, 1980.

Clausewitz, Carl V. *Vom Kriege*. Berlin, Germany: Dümmlers Verlag, 1832–1834.

Hellwig, J. C. L. *Versuch eines aufs Schachspiel gebaueten taktischen Spiels von zwey und mehreren Personen zu spielen*. Leipzig, Germany: S. L. Crusius, 1780.

Hilgers, P. V. "Eine Anleitung zur Anleitung: Das taktische Kriegsspiel 1812–1824." *Board Game Studies: The International Journal for the Study of Board Games* 3 (2000): 59–77.

Hobbes, Thomas. *Leviathan, or the Matter, Forme, & Power of a Common-Wealth Ecclesiasticall and Civil*. 1651.

Locke, John. *Two Treatises of Government: In the Former, the False Principles and Foundation of Sir Robert Filmer, and His Followers, Are Detected and Overthrown. The Latter Is an Essay Concerning the True Original, Extent, and End of Civil-Government*. 1689.

Murray, H. J. R. *A History of Board Games Other Than Chess*. Oxford, UK: Oxford University Press, 1951.

Pias, C. *Computer Spiel Welten*. Berlin, Germany: Diaphanes, 2000.

Rousseau, J. J. *Du Contrat Social ou Principes du Droit Politique* (The Social Contract, or Principles of Political Right). 1762.

Wells, H. G. *Little Wars. A Game for Boys*. London: Palmer, 1913.

Warnets

The warnet (short for “warung internet”), or internet café, became a booming business in Indonesia, from the late 1990s until the end of the first decade of the 2000s, following the rise of internet users and high demand for an internet connection, mostly among university students. During its glorious moment, two-thirds of internet users gained their access through internet cafés. Entering into the second decade of the 2000s, the number of visitors to internet cafés in major cities started to diminish, but internet cafés in second-tier cities and rural areas are still a favorite place for internet users. In 2010, there were an estimated twenty thousand warnets throughout Indonesia.

Warnet is a combination of two Indonesian words: *warung* (stalls) and *Internet*. Basically, this is a place that provides computers with internet connections that customers can rent to do various online activities. However, a warnet is not just a place to rent computer; it becomes a learning center for those who cannot afford a personal computer and internet connection at home. The cashiers and operators of warnets are an important source of information and internet and computer knowledge for consumers. The cashier/operator’s knowledge and sharing ability is sometimes the reason why one warnet attracts more visitors than others. Before the government tightened internet regulations, warnets were also the place to trade digital files, such as pirated music and movies, and other illegal content, such as porn and disturbing pictures.

Warnets are also a popular place for someone who needs to find information, especially for their hobbies, through visiting forums. Commonly, in a warnet, there is a list of local forums that contains the needed basic information and internet links, so users may choose which forum suits their need. In case of a gaming hobby, warnets mostly installed popular online games and LAN games commonly used by students and young adults, such as *Counter-Strike* (2000) and *Ragnarok Online* (2002), and some of these warnets were then transformed into game centers. These warnets became the place where players of massively multiplayer online role-playing games (MMORPGs) and local area network (LAN) games created their clans and guilds, and they became their “headquarters.” Some warnets also sell online game vouchers.

Nowadays, when internet connections are easier to access, and with the shift of gaming to mobile phones, most warnets are closing their businesses. Some still actively use the name “warnet,” but often only as a printing and computer-rental kiosk. Others have transformed their business into a Wifi-Corner (WiCo), which is claimed to be a modern type of warnet. The WiCo service providers such as Telkom and WiFi.id use the #WarnetZamanNow (modern age internet café) hashtag to increase and promote warnet owners to shift their businesses into WiCo service partners. The WiCo business system is still using the internet café payment model, where visitors pay their fare per hour to use the service.

Rhino Ariefiansyah and Febrian

See also: Indonesia

Further Reading

Kristiansen, S., B. Furuholt, and F. Wahid. "Internet Café Entrepreneurs: Pioneers in Information Dissemination in Indonesia." *International Journal of Entrepreneurship and Innovation* 4, no. 4 (2003): 251–263.

Wahid, F., B. Furuholt, and S. Kristiansen. "Information Diffusion Agents and the Spread of Internet Cafés in Indonesia." *Communications of the Association for Information Systems* 13 (2004): 589–614.

Wahid, F., B. Furuholt, and S. Kristiansen. "Internet for Development? Patterns of Use among Internet Café Customers in Indonesia." *Information Development* 22, no. 4 (2006): 278–291.

Web-Based Games

Web-based games can broadly be defined as either games that use an internet connection to update gameplay and provide interaction with other players or games that are delivered through an internet browser. They are a quickly evolving and ever-dynamic genre of digital entertainment, and, as technological breakthroughs continue, more and more titles are being created and lumped into this category. What once was limited to programmers and high-end computer users has now been opened up to the most ubiquitous of devices; social networking sites, modern cell phones, and even handheld gaming devices incorporate elements of web-based gaming. This broad classification of video games includes but is not limited to online games such as MMORPGs, browser-based games, certain console-based games, and even some titles ported to handhelds and mobile devices.

Dating back to the mid-1970s, multiuser domains (MUDs) laid the foundation for modern web-based games. MUDs allowed would-be adventurers to embark on epic adventures and slay digital beasts in fantastic text-based worlds. MUDs predated the graphical-based World Wide Web we know today; as such, users were connected to these games and each other via the ARPANET or through other large-scale computer networks. MUDs continued to evolve, and the mid-1990s saw the advent of the text-based MOO (or MUD, object oriented). These games combined the popularity of text-based MUDs with object-oriented programming, providing unique end user experiences.

The popularity and rapid growth of internet-based technologies exposed a variety of users to MOOs and related games. The term *World Wide Web* was coined around 1990 (Fischetti 2009), and the true genesis of web-based games may be traced to this time. As graphics technologies increased, more familiar multiuser virtual environments (MUVEs), such as *Ultima Online* (1997) and *EverQuest* (1999), were created. MMORPGs—also commonly referred to as MMOs—now include a large percentage of web-based games, with titles such as *World of Warcraft* (2004) claiming more than twelve million global users in 2010. Another popular and less system-intensive form of web-based games is the browser-based or plug-in game. Browser-based games require users to install simple plug-ins, such as Java or Flash, and are used in tandem with web-browsing software.

Web-based games have transitioned from personal computers to console systems over the past few years. The console systems of the three main console makers (Sony, Nintendo, and Microsoft) are all internet-ready and afford gamers the opportunity to play with others from around the world without leaving the comfort of their homes. Increased access to networks and cheaper Wi-Fi access are possible factors spurring on increased usage of these types of games. The recent trend finds web-based games expanding even more quickly as handheld gaming devices and cell phones are able to connect gamers to one another and web-based gaming content.

Web-based games have been presented both positively and negatively in the media. From a negative perspective, in the extreme, some people have played MMORPGs, literally, until death. In 2005, a man in Taegu, South Korea, played for fifty straight hours until he died of exhaustion, and in 2007, a Chinese gamer, Xu Yan, died after playing online games for fifteen straight days. Finally, some have argued that the availability of online games has reduced worker productivity. Other reports contradict these claims and suggest that playing online games help sharpen and refocus workers' minds. Research also suggests that online games can lead to intrinsic motivation (Dickey 2007), collaboration (Papastergiou 2008), and the skills, behaviors, and strategies necessary to live in a complex world (Schrader and McCreery 2008).

Joseph C. DiPietro and Richard E. Ferdig

See also: Online Games

Further Reading

Bartle, Richard. "Summary MUD History." Accessed October 3, 2020. Available at http://www.livinginternet.com/d/di_major.htm.

Dickey, M. "Game Design and Learning: A Conjectural Analysis of How Massively Multiple Online Role-Playing Games (MMORPGs) Foster Intrinsic Motivation." *Educational Technology Research & Development* 55, no. 3 (2007): 253–273.

Fischetti, M. "Facts about the Web's Creation: Everything You Ever Wanted to Know about the Web's First Days." *Scientific American*, March 12, 2009. Available at http://www.scientificamerican.com/article.cfm?id=facts-about-the-webs-creation.

Kim, Scott. "Designing Web Games That Make Business Sense." In *Proceedings of the 2001 Game Developers Conference*, 2001. Available at https://web.archive.org/web/20111130053218/http://www.scottkim.com/thinkinggames/GDC01/webgamesbusinesssense.html.

Klimmt, C., H. Schmid, and J. Orthmann. "Exploring the Enjoyment of Playing Browser Games." *CyberPsychology & Behavior* 12, no. 2 (2009): 231–234.

Papastergiou, M. "Online Computer Games as Collaborative Learning Environments: Prospects and Challenges for Tertiary Education." *Journal of Educational Technology Systems* 37, no. 1 (2008): 19–38.

Rosenzweig, G. "Designing Web-Based Games." *Proceedings of the 2000 Game Developers Conference*, 483–487, 2000.

Schrader, P., and M. McCreery. “The Acquisition of Skill and Expertise in Massively Multiplayer Online Games.” *Educational Technology Research & Development* 56, nos. 5/6 (2008): 557–574.

Weisbecker, Joyce (1958–)

Joyce Weisbecker developed several games for RCA and is currently considered the first woman to work as a commercial video game developer. The daughter of RCA engineer Joseph Weisbecker, who had himself worked on the development of home computer and video game systems, Joyce Weisbecker was afforded many early opportunities. Her father developed several computer system prototypes as after-hours projects and showed his daughter how to program on these machines. RCA later developed the elder Weisbecker’s prototypes into multiple products, including the Cosmac VIP, a kit with which consumers could build their own personal computers, and the Studio II, a game console. Joyce Weisbecker’s first two games, *Snake Race* and *Jackpot,* were included in the manual for the RCA VIP. RCA did not pay her for these initial games. However, later projects, including the quiz game *TV Schoolhouse I*, which she completed in August 1976, earned the high school graduate status a paid contract. Weisbecker worked with pen and pencil, handwriting code and working with one of her father’s computer prototypes.

TV Schoolhouse I was an educational quiz game conceived by the elder Weisbecker to leverage the textbook publishing projects and reputation of RCA subsidiary Random House. Joyce Weisbecker developed the quiz game and also produced two further games in October 1976: *Speedway* and *Tag*. These games tested the graphics capabilities of the computers and Weisbecker’s creativity. The cars in *Speedway*, for example, appear as simple rectangles, much like the cars in Exidy’s *Death Race* (1976) arcade game. While Weisbecker’s father had suggested the idea for *TV Schoolhouse I*, *Speedway* was a design she conceptualized, developed, and pitched herself. *Tag,* a much smaller game, was included on the same cartridge as *Speedway*. In 1977, she programmed her last three games for RCA; *Sequence*, *Slide*, and *Sum Fun*, which were released in the RCA VIP Cormac Game Manual, sold as a supplement to the VIP’s standard documentation.

With the end of her contract with RCA, Weisbecker chose not to pursue game development further, turning her focus to her university classes at Rider University, where she double majored in computer engineering and actuarial science. At the time, the industry was new and relatively unstable. For Weisbecker, a game development career at the time would have meant living at home, personally copying game manuals and cassettes, and mailing out games to stores and customers. Instead, after graduating, she pursued a career in actuarial science, later returning for a bachelor’s degree in electrical engineering and a master’s in computer science.

Jennifer deWinter and Carly A. Kocurek

See also: Game Design

Further Reading

Edwards, Ben J. "Rediscovering History's Lost First Female Video Game Designer." Fast Company, October 27, 2017. Available at https://www.fastcompany.com/90147592/rediscovering-historys-lost-first-female-video-game-designer.

West and Zampella v. Activision

Jason West and Vince Zampella, founders of the studio Infinity Ward, released *Call of Duty: Modern Warfare 2* (2009) and were fired from their own studio by parent company Activision, allegedly for "breaches of contract and insubordination." West and Zampella then sued Activision for $36 million, claiming that their firing was to prevent Activision from having to pay their bonuses. After West and Zampella were fired, forty-six Infinity Ward employees, almost half the company's staff, abruptly quit and left the company. The "Infinity Ward Employee Group," made up of thirty-eight current and former employees, also decided to sue Activision for between $75 million and $125 million in compensatory damages for unpaid bonuses from *Call of Duty: Modern Warfare 2*.

Activision countersued West and Zampella, claiming that they were trying to steal away the Infinity Ward team for their own gain, and also named Electronic Arts (EA) as part of the lawsuit, for conspiring with West and Zampella. Overall, around $1 billion was at stake in the *West and Zampella v. Activision* suit, as West and Zampella's winning of the suit would give them the power to stop the development and release of future games in the *Modern Warfare* settings of the franchise.

The trial's date was set for May 23, 2011, but was then rescheduled to December 14, 2011, and then later to March 29, 2012, and then to June 1, 2012. On March 31, 2012, while waiting for the case to go to court, the two parties settled out of court, though the details of the settlement remained undisclosed. During this time, *Call of Duty: Modern Warfare 3* was in development and was released November 8, 2011.

In 2010, West and Zampella started a new company, Respawn Entertainment, and thirty-eight of the forty-six employees who left Infinity Ward came to work for them. Respawn Entertainment's first game was *Titanfall* (2014), which won over sixty awards after it was revealed at the 2013 Electronic Entertainment Expo (E3).

Mark J. P. Wolf

See also: *Call of Duty* Series

Further Reading

McWhertor, Michael. "Activision Has Paid Infinity Ward More Than $493 Million in Bonuses for Call of Duty." Polygon, May 25, 2012. Available at https://www.polygon.com/gaming/2012/5/25/3044195/activision-infinity-ward-bonuses-call-of-duty.

McWhertor, Michael. “Settlement Reached in Call of Duty’s Billion Dollar West v. Activision Lawsuit.” Polygon, May 31, 2012. Available at https://www.polygon.com/gaming/2012/5/31/3049988/activision-call-of-duty-trial-placeholder.

Wii. *See* Nintendo Wii

Wii Sports

In 2006, when Sony and Microsoft were marketing their new consoles’ realistic graphics and online capabilities, Nintendo chose to prioritize casual fun and offline multiplayer experiences with a new gestural interface called Wii Remote, which attracted new kinds of players and changed the *ethos* of game culture as a whole. Released as a pack-in game with the new console, *Wii Sports* was the flagship of Nintendo’s revolutionary shift toward more inclusive and performative game design, with five minigame sports simulations (tennis, baseball, bowling, golf, and boxing) that brought people of all ages and genders together. The game was a key component of what Jesper Juul called the “casual revolution,” defying the limits between hardcore/casual video games and questioning the prejudices implied in such categorizations, thanks to a juicy, intuitive, and addictively mimetic interface: “fun in new ways, because players can learn from watching each other, because failure becomes an enjoyable spectacle, and because they become more immediately social” (2009). In an increasingly individualistic world, where playing games was becoming more of a self-centered experience, *Wii Sports* recreated the social camaraderie of early arcades, where the gathering together of different players around a screen, in a shared space, was key. In addition, numerous scientific studies have quantified health and social benefits related to the game, especially among older adults and nontraditional gamers (Schell et al. 2016).

By choosing to promote the Wii with a mimetic sports simulator, Nintendo reclaimed the real-world player space (as opposed to the virtual screen space) as the center of game culture, making the best of the fact that millions of players already knew the basic rules of tennis or bowling and could therefore focus on the fun and often hilarious movements of their bodies in front of (and not only on) the screen: kids, parents, and grandparents played and laughed together in an unprecedented scale in game history. This unique celebration of diversity through failure, for comedic purposes, links *Wii Sports* with a longstanding tradition of visual humor that goes back to *commedia dell’arte,* pantomime, and slapstick: not by chance, great silent clowns such as Chaplin, Lloyd, and Keaton released immensely popular movies making fun of the very same sports featured in Nintendo’s game (although the most Wii-like parody of tennis takes place in *Monsieur Hulot’s Holiday* [1953]). As proven by Seán Crosson in his analysis of sports and film (2013), mocking sport via different kinds of parody enables audiences to question the cultural capital and power dynamics so deeply rooted in contemporary societies. Therefore, *Wii Sports* can be read not only as a humorous and socially empowering take on bodily performance in video games but also, and more importantly, as a critique of the competitive, patriarchal, and agonistic culture of hardcore sport games that "turn the unquantifiable into rationalized calculations and code, to give the gamer the sensation of control and direction they lack in relation to the sports they follow, as well as other aspects of the capitalist society in which they live" (Crawford 2015). Against the male-centered for-profit homogenization of sport games as a power-drive, playing *Wii Sports* will always be an alternative form of resistance, where the score is not measured in points but in laughs.

Manuel Garin

See also: Nintendo Wii

Further Reading

Carroll, Noël. *Comedy Incarnate*. Malden, MA: Blackwell Publishing, 2007.

Crawford, Garry. "Is It in the Game? Reconsidering Play Spaces, Game Definitions, Theming, and Sports Videogames." In *Games and Culture* 10, no. 6 (2015): 571–592.

Crosson, Séan. *Sport and Film*. New York: Routledge, 2013.

De Schutter, Bob. "Never Too Old to Play: The Appeal of Digital Games to an Older Audience." *Games and Culture* 6, no. 2 (2011): 155–170.

Juul, Jesper. *A Casual Revolution. Reinventing Video Games and Their Players*. Cambridge, MA: MIT Press, 2009.

Schell, Robyn, et al. "Social Benefits of Playing Wii Bowling for Older Adults." *Games and Culture* 11, nos. 1–2 (2016): 81–103.

Williams (Company)

Williams Manufacturing Company was established in Chicago in the early 1940s. Founded by Harry E. Williams, the company initially specialized in electromechanical games and pinball conversions before expanding to pinball manufacturing. In 1964, Williams was purchased by the Seeburg Corporation, a jukebox manufacturer, and reorganized as Williams Electronic Manufacturing Division. In 1973, it made its first foray into the arcade video game market with *Paddle-Ball*—a *PONG* (1972) clone. The company was incorporated in 1974 as Williams Electronics, Inc., a wholly owned subsidiary of Seeburg. Following the latter's bankruptcy in 1979, Williams was spun off as an independent entity. By 1981, it was the leading manufacturer of pinball machines in the United States.

In 1980, the company released Eugene Jarvis's *Defender*. The fast-and-furious side-scrolling shooter quickly went on to become one of the most popular games of the time. It was followed up by such titles as *Stargate* (1981)—Jarvis's sequel to *Defender*—and later by *Joust* (1982), *Sinistar* (1982), and *Robotron: 2084* (1982). To accommodate the rising demand for video games, Williams cut down its pinball production. However, by late 1982, the arcade video game market slowed considerably and eventually crashed the following year (see Crash of 1983). The company posted losses for the next few years, but thanks to renewed public interest in pinball machines, management turned the tide in 1986. In 1988, Williams's parent company, WMS Industries, Inc., purchased its main competitor, Bally/Midway, the pinball and video game division of Bally Manufacturing Company. The production of pinball tables continued under the Williams and Bally names, and Midway developed video games for the home and arcade markets.

In 1991, Midway absorbed Williams's video game division, and WMS Industries created Williams Gaming, which manufactured pinball tables and slot machines. Throughout the 1990s, casino equipment was steadily becoming the company's focus, until it decided to leave the video game business in 1998. At that time, Midway Games, Inc., was spun off and became an independent company. Williams Gaming made a final attempt to revitalize the dwindling pinball sales with the hybrid Pinball 2000 platform, combining pinball tables with video game elements. In the face of rapidly dwindling sales, the company discontinued its pinball business in 1999 and, under the name WMS Gaming, focused exclusively on slot machines.

P. Konrad Budziszewski

See also: Arcade Games

Further Reading

Jensen, Russ. "A Visit with Harry Williams." *Russ Jensen's Pinball History Page*. Available at http://www.pinballcollectorsresource.com/russ_files/harryvisit.html.

Kurtz, Bill. *Encyclopedia of Arcade Video Games*. Schiffer Book Farm, PA: Schiffer, 2003.

Williams, Roberta (1953–)

Roberta Williams founded the computer game company Sierra On-Line with her husband, Ken Williams. She designed a number of important graphical adventure games and is considered a key figure in the history of the genre.

In 1979, IBM programmer Ken Williams purchased an Apple II with the intention of developing a Fortran compiler. However, Roberta began playing text-based adventure games and quickly realized the computer's graphic capabilities could be leveraged for an enhanced, graphic-based adventure game. Over a three-week period, she wrote a script for a game and then convinced Ken to assist in development in his off-work hours. The couple released the game as *Mystery House* (1980) under the brand On-Line Systems (later Sierra On-Line). The game proved a commercial success, selling fifteen thousand copies, and helped establish Sierra as a key player in the growing computer software and computer game business.

Throughout the 1980s and 1990s, Roberta Williams developed over twenty games published through Sierra On-Line. She is perhaps best known for the highly influential *King's Quest* series, which includes eight titles published between 1984 and 1998, and *Wizard and the Princess* (1980), which is sometimes called *King's Quest 0*. The *King's Quest* games follow the royal family of the Kingdom of Daventry, with the story covering multiple generations and an expansive geographic landscape. The series was integral to establishing Sierra's role as a key player in the U.S. video game and software market. Further, Williams designed the computer game *The Dark Crystal* (1983), based on the 1982 Jim Henson film of the same name; the game went on to win 1984 Best Computer Adventure at the Arkie Awards. Reportedly, Williams had designed the game over roughly a month before turning it over to the development team.

Williams's edutainment title *Mixed-Up Mother Goose* (1987) featured her on the cover in the role of Mother Goose. Sierra remade the game multiple times, and it was a critical and commercial success. The game was recognized with the 1991 Software Publishers Association Excellence in Software Award for Best Early Education Program, and by 1996, Sierra had sold five hundred thousand copies of the game. Williams designed a number of other games, including the *Laura Bow* series, and the full-motion video game *Phantasmagoria* (1995), which she has called her favorite design.

While Williams herself was prolific, Sierra On-Line was even more so. The founders recruited writers and developers, including Jane Jensen, Al Lowe, and other notable figures. Williams's influence on the adventure game genre includes her own numerous titles as well as her work in founding and running Sierra On-Line, one of the most important publishers and distributors of computer games. Sierra On-Line was acquired by CUC Software in 1996, but Williams continued working as a designer at Sierra until she retired in 1999. Postretirement, Williams has largely stayed out of the public eye; however, she did contribute to the design of the Facebook game *Odd Manor* (2011), on which Chris Williams, Roberta's son, and her husband, Ken Williams, served as lead engineer.

Jennifer deWinter and Carly A. Kocurek

See also: Adventure Games; Sierra Entertainment

Further Reading

Nooney, Laine. "A Pedestal, a Table, a Love Letter: Archaeologies of Gender in Videogame History." *Game Studies* 13, no. 2 (2013). Available at http://gamestudies.org/1302/articles/nooney.

Salter, Anastasia. "King's Quest: Narrative." In *How to Do Things with Video Games*, edited by Matthew Thomas Payne and Nina B. Huntemann, 29–35. New York: New York University Press, 2019.

World (of a Video Game)

Many video games, like novels and narrative film and television shows, can be said to have a diegetic world, that is, the imaginary or fictional world in which the work's characters live and where events take place. Such worlds are usually made in support of a narrative, although worlds do not necessarily have to contain stories, and not all of them do. Video games such as those of the *Sim* series and other sandbox games allow players to build imaginary worlds, but there is no predetermined narrative that occurs there, although the player's experiences and interaction within the world may constitute something like a narrative.

Video game worlds are necessarily composed of several things: some kind of geography, inhabitants, action, and logical consequences that are the outcome of actions. Every game world has some kind of space in which the game's action takes place, from a simple blank playing field that is a single screen in size (as in many early arcade games), to a verbal description (in the case of text adventures), to a vast, elaborately detailed world with hundreds of thousands of players (as in massively multiplayer online role-playing games [MMORPGs]). These areas are displayed on-screen, and many games, especially adventure games, require exploration of the game world, where other characters are encountered, objects are found, and quests are completed. Sometimes the revelation of game world space is the game's main objective, although it is more likely to be a subgoal required by other game goals. In many games, especially those with three-dimensional graphics, there is usually some sense of what lies beyond the game world space that the player's avatar can actually visit, conveyed by backdrop imagery (depicting an extension of the game world out to a distant horizon) that is placed around the edges of the active game area.

The inhabitants of the game world include the player's avatar (or avatars), the avatars of other human players, and the non-player characters (NPCs) controlled by the game programming. All characters, whether avatars or NPCs, usually have some kind of purpose, motivation, and goal-oriented behavior, which may help or hinder that of the player's avatar (or the player's intervention, as in the case of sandbox games in which the player does not control an avatar directly). The characters initiate action within the game world, although action can also be initiated by the game program's direct control of the game world itself—for example, changing weather conditions, a diurnal or seasonal cycle, or events such as earthquakes or tornadoes (as in *SimCity* [1989]). Quite often, the action of the game world's characters directly affects the state of the game world itself, and a particular game world state may even be the game's objective.

Finally, a game world will operate according to some logic that it uses to assign consequences to actions taken by the game world's characters. These consequences are usually consistent and can be expected in advance once the player learns how the world works. Through knowledge of these consequences, players can make gameplay choices that move the game world's state in a desired direction. The game world's logic determines much of the gameplay experience, and it may also shape the look and feel of the game world itself, suggesting guidelines for design aesthetics. Other aspects of the game world controlled by the game engine include the physics of game events, the automatic positioning of the implied camera that controls the player's point of view, artificial intelligence (AI) controlling NPCs, and the player's interaction with the world.

HISTORY OF VIDEO GAME WORLDS

Although text adventure games created their worlds through words, similar to literature, fast action and a feeling of immersion and immediacy require a visual representation of a game's world. Over time, the visuals of video game worlds grew from the single-screen games of the 1970s, to scrolling screens that revealed a much larger world beyond the edges of the screen (beginning with *Super Bug* [1977]), to worlds made up of multiple screens that cut one to the next (beginning with *Adventure* [1979] for the Atari VCS 2600), to three-dimensional worlds with z-axis depth that extends into the screen (as in *Maze War*[1974], *Battlezone* [1980], and *Myst* [1993]). With greater memory available in computer discs and diskettes and the move from cartridges to CD-ROM-based games in the late 1980s, worlds were able to become even larger and more detailed, allowing more player involvement and engagement. Finally, as online games developed into multiuser domains (MUDs) and, later, MMORPGs, their game worlds were inhabited by an increasing number of player characters, and many became persistent worlds, operating continuously, twenty-four hours a day.

Procedurally generated worlds, such as those of *Minecraft* (2009) and *No Man's Sky* (2016), can be extremely vast and may contain endless landscapes or billions of planets, which are generated mathematically from seeds and algorithms. The size and complexity of these worlds is so vast that no one person can experience more than a small fraction of the events occurring in them. The ongoing existence and high degree of interactivity of these worlds, as well as the necessity of choosing what is seen or experienced from myriad simultaneous events, creates an experience quite unlike that of the imaginary worlds experienced through traditional media like books, films, and television shows.

In traditional narratives involving imaginary worlds, the main character is often a traveler to a new world, through whom the audience experiences the world vicariously. In earlier worlds, the main character tended to be a traveler and observer; as time went on, and especially into the twentieth century, main characters became more actively involved in the imaginary worlds they visited, even becoming agents of change in those worlds. Video game worlds can be seen as extending that interactivity to the audience members and, thus, can be seen as another advancement of the imaginary world tradition begun thousands of years ago.

Mark J. P. Wolf

See also: Navigation (Spatial); Navigation (Temporal); Procedural Generation; Space (Narrative); Space (Visual); Subcreation; Time

Further Reading

Juul, Jesper. *Half-Real: Video Games between Real Rules and Fictional Worlds*. Cambridge, MA: MIT Press, 2005.

Meigs, Tom. *Ultimate Game Design: Building Game Worlds*. San Francisco, CA: McGraw-Hill Osborne Media, 2003.

Morris, Dave, and Leo Hartas. *The Art of Game Worlds*. New York: HarperCollins Publishers, 2004.

Nitsche, Michael. *Video Game Spaces: Image, Play, and Structure in 3D Worlds*. Cambridge, MA: MIT Press, 2009.

Wolf, Mark J. P. *Building Imaginary Worlds: The Theory and History of Subcreation*. New York: Routledge, 2012.

World Cyber Games

The World Cyber Games (WCG) is an esports tournament that was held annually from 2000 to 2013 and again in 2019. Unlike many tournaments, the WCG hosts competitions in multiple titles—the yearly selection of which reflects game industry trends as well as publishers' willingness to lend their intellectual property—and asks players to compete on behalf of their country rather than the professional organizations to which they are contracted. In this way, the WCG was (and is) billed as a kind of "Esports Olympics," invoking competition among nation-states as part of a broader ideal of global humanism. "[The WCG's] vision is to contribute to making the world better by offering joy and helping settle conflicts," as the company's current mission statement reads. "[We] seek to establish WCG not merely as a contest of esports matches but also as a festival for people all over the world to live in harmony" (World Cyber Games n.d.).

The first WCG event was held in Everland, a theme park in Yongin, South Korea, in October 2000. At the time, interest in competitive gaming was growing, and many players and commercial actors invoked esports as a way to legitimate professional gaming as a worthy cultural pursuit (Taylor 2012). This often resulted in emulating the practices, cultures, and institutions of so-called traditional sports. Given the worldwide (though still niche) popularity of professional gaming, an Olympic-style event was an inevitability. In South Korea, where the esports industry was most mature due to a confluence of social, technological, and economic factors, the Ministry of Culture and Tourism, the Ministry of Information and Communication, and the Samsung corporation joined forces to put on WCG (Jin and Chee 2009). Over the next decade, the WCG grew dramatically in size and scope, becoming one of the most prestigious esports tournaments in the world. Whereas, in 2000, 174 participants representing seventeen countries competed, these numbers blossomed to 800 players from seventy-eight countries at the tournament's peak popularity in 2008.

However, the WCG began to lose ground in late 2000s. Increasing competition from independent tournament organizers such as Dreamhack, ESL, and MLG and new first-party tournaments hosted by game publishers such as the League Championship Series siphoned away some of the WCG's prestige. Moreover, as the esports industry matured and the number of tournaments grew, top players often prioritized competing with professional teams rather than one-off nation-based ones. The situation was made worse by an unsuccessful television venture (a reality show titled *WCG Ultimate Gamer* that, regrettably for all, ran for two seasons on SyFy in 2009 and 2010) and mismanagement from WCG's executive staff, who were infamously described by one corporate partner as "impossible to work with" (O'Neill 2014). Finally, in 2014, WCG announced that the organization was going on indefinite hiatus.

It is unclear whether the current revival of the WCG, which is organized by the South Korean game publisher Smilegate, will have any staying power. Even so, its underlying motivation—the conscious emulation of traditional sports' most renowned mega-events—lives on in tournaments like the Overwatch World Cup and the International Olympic Committee–sanctioned Intel World Open. If the World Cyber Games originally represented a vision for what a global esports event could someday be, that vision has since begun to materialize, with or without it.

Simon Ferrari and William Clyde Partin III

See also: Esports

Further Reading

Jin, Dal Yong, and Florence Chee. "The Politics of Online Gaming." In *Gaming Cultures and Place in Asia-Pacific*, edited by Larissa Hjorth and Dean Chan, 19–38. New York: Routledge, 2009.

O'Neill, Patrick Howell. "The Olympics of Esports Shuts Down, Partners Say CEO Was 'Impossible to Work With.'" *Daily Dot*, February 5, 2014. Available at https://web.archive.org/web/20150521024201/http://www.dailydot.com/esports/world-cyber-games-esports-shut-down/.

Taylor, T.L. *Raising the Stakes: The Professionalization of Computer Gaming*. Cambridge, MA: MIT Press, 2012.

World Cyber Games. "Global Esports Festival for a Better World." Accessed October 3, 2020. Available at https://www.wcg.com/main/about/about-wcg?lang=en.

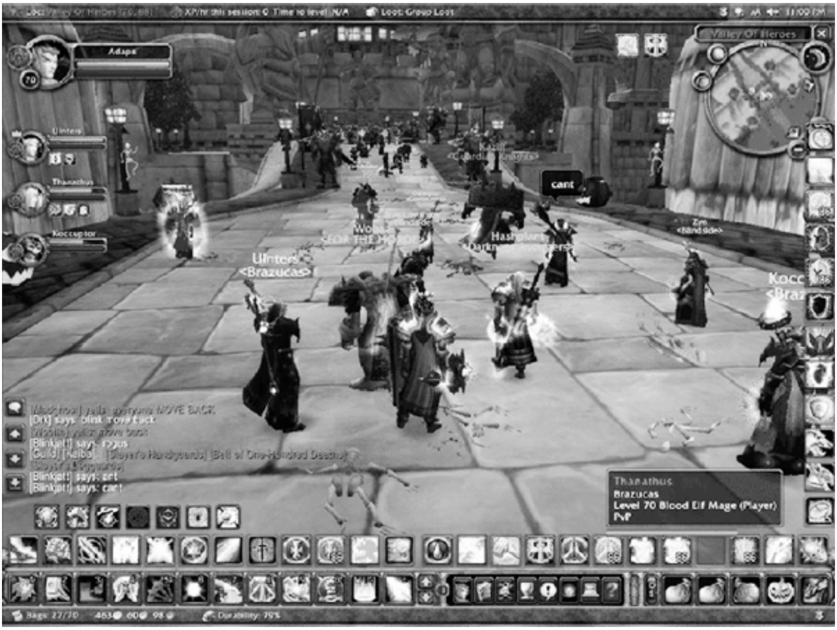
World of Warcraft (WoW)

World of Warcraft (*WoW*), developed by Blizzard Entertainment, is a massively multiplayer online role-playing game (MMORPG), one of the most popular online games of its genre, and one of the biggest successes of the video game industry, with a peak of over twelve million players in 2010. *WoW* was officially launched on November 23, 2004, in North America, Australia, and New Zealand and in Europe and Asia in 2005; it is distributed in seven languages.

WoW takes place in a persistent world, with anywhere from five thousand to thirty thousand players online simultaneously at any given time on each of the servers (or "realms") hosted by the company. The game's main goal is to increase the power of the player's character. Progression is calculated with experience points (Xp) between the levels 1 to 120, but players can evaluate their progression by the value of the equipment they own, their skill points, their reputation within different factions, honor points, and so on. Players are invited to undertake quests, complete dungeons, kill monsters and other players, make money, discover the world, and interact with other players. When characters reach the highest level, in what is called the "End-game" (also known as the

“Elder game”), players usually concentrate their activities on raiding or completing top-tier dungeons and fighting in arenas or battlegrounds. In an arena, a team of two, three, or five players has to kill another team in hand-to-hand fights, while in a battleground, one team of more than ten players has to attack or defend specific spots, capture the flag, or control bases and resources.

WoW is based on the *Warcraft* series of real-time strategy (RTS) games, extending their world into an MMORPG. *WoW* features three modes of gameplay: player versus environment (PvE), player versus player (PvP), and role-playing (RP). The game’s logic and vocabulary are inspired by the medievalist fantasy genre and the Dungeons & Dragons (1974) tabletop role-playing games (RPGs) created by Gary Gygax and Dave Arneson as well as by previous MMORPGs, especially *EverQuest* (1999). A vast mythology has been created for *WoW* to explain the history of wars, alliances, leaders, and so on, and it defines the spatial and social organization of the game.



A screenshot from *World of Warcraft*. (Courtesy of Mark J. P. Wolf)

To play the game, players choose an avatar in one of two factions, the Alliance or the Horde, and between races in each faction: the Alliance includes human, dwarf, night elf, gnome, and dranei, and the Horde includes orc, undead, tauren, troll, and blood elf. Characters in each race can be divided into ten classes: druid, hunter, mage, paladin, priest, rogue, shaman, warlock, warrior, and death knight. The choice of class has a big impact on the player’s role during combat, such as causing long-distance damage, tanking or fighting, healing, or crowd controlling. Players also must select their character’s gender and some physical features, and, once in the game, they can choose up to two specific professions per character and build a talent tree.

Part of the game can be played alone, but it is also based on social interaction between players, who are invited to gather together in temporary groups or more permanent groups called “guilds.” Guilds are managed by players and are more or less organized, populous, and regulated according to their leaders, who determine the type of guild and its rules and goals. Two classical oppositions are the raiding guild, based on hard progression, and the casual guild, based on socialization. The game has also an economic system principally dependent on trading between players. The currency is called “gold,” and some players, who specialize in collecting gold to sell for real-world currency, are called “gold farmers.” Gold farming and selling characters are forbidden by Blizzard Entertainment, although a large market for it exists on the internet, which is difficult to police because of the scale of the game and its online culture.

Developer and publisher Blizzard Entertainment, the maker of *WoW*, is headquartered in Irvine, California. It was founded in 1991 by Allen Adham, Michael Morhaime, and Frank Pearce under the name Silicon & Synapse, which was changed to Blizzard Entertainment in 1994. Before *WoW*, Blizzard developed a number of games, including *Warcraft: Orcs and Humans* (1994), *Warcraft II: The Tides of Darkness* (1995), and *Warcraft III: Reign of Chaos* (2002) as well as *Diablo* (1997) and *StarCraft* (1998), which both began series of their own. In May 2016, Blizzard also released a team-based multiplayer first-person shooter (FPS) called *Overwatch*.

Blizzard has released seven *WoW* expansions. The first two were *World of Warcraft: The Burning Crusade* (January 2007) and *World of Warcraft: Wrath of the Lich King* (November 2008), which, according to the company’s official statistics, sold four million copies in its first month. *World of Warcraft: Cataclysm* (December 2010) was followed by *World of Warcraft: Mists of Pandaria* (September 2012), *World of Warcraft: Warlords of Draenor* (November 2014), and *World of Warcraft: Legion* (August 2016). The last expansion to date is *World of Warcraft: Battle of Azeroth* (August 2018), and according to Blizzard, it sold 3.4 million units in its first day, making it the fastest-selling *WoW* expansion. Each expansion has raised the maximum character level, which is 120 as of 2019, and as new expansions are released, the older ones are being included in the base game.

Blizzard stopped releasing the official number of subscriptions for *World of Warcraft* in September 2015. At this date, *WoW* had 5.5 million monthly paying players. In 2016, Blizzard Entertainment released a movie called *Warcraft*, based on the Warcraft universe, directed by Duncan Jones and produced by Legendary Pictures, Blizzard Entertainment, and Atlas Entertainment. Blizzard also produces derivative products of *World of Warcraft*, such as tabletop games, collectible card games, books, and comics. On August 26, 2019, Blizzard released a “classic” edition of Warcraft that enabled players to experience the game as it was before the expansions. Due to the persistent world and the number of players committed to the game, *WoW* is one of the most researched games in the field of game studies.

Maude Bonenfant

See also: Activision Blizzard; Massively Multiplayer Online Role-Playing Games

Further Reading

Blizzard Entertainment. *World of Warcraft Atlas*. Indianapolis, IN: Brady Games (a division of Penguin Group), 2008.

Corneliussen, Hilde G., and Jill Walker Rettberg, eds. *Digital Culture, Play, and Identity: A World of Warcraft Reader*. Cambridge, MA: MIT Press, 2008.

World Video Game Hall of Fame

The World Video Game Hall of Fame at the Strong National Museum of Play recognizes individual electronic games of all types—arcade, console, computer, handheld, and mobile—that have enjoyed popularity over a sustained period and have exerted influence on the video game industry or on society in general. The inductees into the World Video Game Hall of Fame stand out for their major impact on the history of video games.

Inductees to the World Video Game Hall of Fame as of 2018 include *Spacewar!* (1962), *The Oregon Trail* (1971), *PONG* (1972), *Space Invaders* (1978), *Pac-Man* (1980), *Donkey Kong* (1981), *Tetris* (1984), *Super Mario Bros.* (1985), *The Legend of Zelda* (1986), *John Madden Football* (1988), *Street Fighter II* (1991), *Sonic the Hedgehog* (1991), *DOOM* (1993), *Pokémon Red* and *Green* (1996), *Tomb Raider* (1996), *Final Fantasy VII* (1997), *The Sims* (2000), *Grand Theft Auto III* (2001), *Halo: Combat Evolved* (2001), and *World of Warcraft* (2004). All inductees are honored in a permanent exhibit at the Strong.

World Video Game Hall of Fame
World Video Game Hall of Fame
PONG
ATARI

The World Video Game Hall of Fame at the Strong National Museum of Play in Rochester, New York. (Debra Millet/Dreamstime.com)

Any member of the public can nominate a game to the World Video Game Hall of Fame. Final selections are made on the advice of the Player's Choice ballot and an International Selection Advisory Committee composed of journalists, scholars, and other individuals familiar with the history of video games and their role in society.

The World Video Game Hall of Fame recognizes individual electronic games that meet the following criteria:

- **Icon-status:** The game is widely recognized and remembered.
- **Longevity:** The game is more than a passing fad and has enjoyed popularity over time.
- **Geographical reach:** The game meets the above criteria across international boundaries.
- **Influence:** The game has exerted significant influence on the design and development of other games, on other forms of entertainment, or on popular culture and society in general. A game may be inducted on the basis of this criterion without necessarily having met all of the first three.

The Strong honors the games in an annual induction ceremony. In 2018, the World Video Game Hall of Fame published a book entitled *A History of Video Games in 64 Objects* that tells the history of the inductees as part of the longer history of video games. In 2021, the Strong will open a major gallery dedicated to celebrating the members of the World Video Game Hall of Fame within a larger exhibit that explores the history of video games.

The World Video Game Hall of Fame is administered by the Strong's International Center for the History of Electronic Games (ICHEG). At sixty thousand video games and related artifacts and hundreds of thousands of archival materials documenting the history of video games, the Strong's collection is the largest and most comprehensive public assemblage of such items anywhere.

Jon-Paul C. Dyson

See also: International Center for the History of Electronic Games; Strong National Museum of Play

Further Reading

World Video Game Hall of Fame website. Accessed October 3, 2020. Available at http://www.worldvideogamehalloffame.org/.

World War II in Video Games

World War II, a multinational armed conflict that lasted six years, from September 1, 1939, until September 2, 1945, has influenced the design, subject matter, and narrative content of video games since the mid-1970s. Early examples of video games set during World War II include *Desert Fox* (1976), *Sea Wolf*

(1976), *M-4* (1977), and *M-79 Ambush* (1977), their titles respectively referring to the German field marshal Erwin Rommel, the World War II USS *Seawolf Sargo* class submarine commissioned in 1939, the M4 Sherman Tank predominantly used by the United States during the conflict, and an iteration of Japanese military aircraft. These early games were exceedingly minimalist, presenting the player with undifferentiated depictions of land, sea, or air where point-and-shoot battles occur.

More complex representations of World War II released in the 1980s and 1990s would foundationally structure an array of game genres that included flight simulators, real-time and turn-based strategy games, and first-person and third-person shooting games. Shooting games predominantly place the game player on the side of the Allied powers during the conflict, requiring players to play as infantry fighting for the United States, the Soviet Union, the United Kingdom, or France, combating the Axis-aligned countries of Germany and Japan, whereas flight simulators and strategy games frequently allow players to operate as pilots and commanding officers fighting on either side of the war. Of the numerous individual battles that occurred during the war, World War II video games frequently focus on major military conflicts, such as the Pacific Theater, the Eastern Front, and the Battle of Normandy, representing these conflicts differently depending on the genre and the technical capabilities of the individual games and the platforms on which they are played. Many World War II video games emphasize an attention to historical detail on multiple tiers, foregrounding the factual fidelity of both the battles in which players participate and the weapons they employ during the conflict, promoting these games as accurate representations or simulations of historical occurrences. Other games, such as Id Software's first-person shooter *Wolfenstein 3D* (1992), actively intertwine history and fantasy, eschewing historical accuracy in the construction of horrifying game worlds where players explore the depths of Nazi villainy.

World War II flight simulators, video games that feature simulated aerial combat based on actual missions flown during the war, achieved early prominence within video game history. Capcom's *1942*, released in video game arcades in 1984 and later ported to the Commodore 64 and the Nintendo Entertainment System (NES), stands as a popular early example of a flight simulator based on World War II; in a vertically scrolling shooting scenario, the player must guide a "Super Ace" plane, designed to resemble a Lockheed P-38 Lightning aircraft, over Tokyo, attempting to destroy the Japanese air fleet during the war's Pacific Theater.

Although *1942*'s simulation of aerial warfare is inherently limited because of the technological restrictions of early arcade and home console systems, later flight simulators incorporate far greater attention to detail in terms of the plethora of controls available to players and the visual representation of the areas over which they fly. Dynamix's *Aces of the Pacific* (1992) allows players to operate multiple types of aircraft flown during the Pacific Theater and choose to play historical missions based on specific conflicts, notable in that the player can play as either Japanese pilots attacking Pearl Harbor or American fighters defending against the attack.

MicroProse's computer game *1942: The Pacific Air War* (1994) expands gameplay beyond the shooter style evident in the aforementioned titles, allowing players to participate in a "tour of duty" mode in which they are required to not only fly and fight in singular missions but also manage the entire aerial fleet through a campaign map. Microsoft's *Combat Flight Simulator WWII Europe* (1998) and its sequels provide players with databases of aircraft, scenery, and statistics, which they can reprogram, allowing user-generated content to enliven the game's replay value. A focus on dynamism and malleability is also evident in *War Thunder* (2013), which emphasizes the diversity of craft that the player can pilot, allowing for the control of over one thousand air, land, and sea vehicles, featuring planes from a dozen countries. It replicates actual missions from World War II, conflicts that precede and follow World War II, and speculative missions that were planned but did not occur.

In contrast to World War II flight simulators, strategy video games, also known generically as computer wargames, emphasize the tactics and minute operations of military combat, avoiding the player-orchestrated participatory shooting action of the flight simulator genre, allowing the player to oversee large-scale military fronts. Strategy games such as Strategic Simulations, Inc.'s *Panzer General* (1994) feature multiple maps, frequently viewed from an aerial, seemingly omniscient perspective, in which players control a diverse array of military units as they advance on the enemy. Players must leverage health statistics, weaponry, and supplies against one another, applying each element differently to the diversified military units under their control, to effect victory.

Among World War II video games, strategy games most clearly resemble board games, often depicting the battlefield through a hexagonal map; indeed, some of the earliest versions of World War II strategy video games include computer simulations of board games, such as digital versions of wargame publisher Avalon Hill's *Squad Leader* (1977) and *Advanced Squad Leader* (1985). Strategic Simulations' *Computer Bismarck* (1980) is hailed as the first "serious" strategy game designed explicitly for a computer, chronicling the last battle of the German battleship *Bismarck* in May 1941. Like other releases from Strategic Simulations, such as *Panzer General* and *Steel Panthers* (1995), *Computer Bismarck* is a turn-based strategy game in which a single player and the computer (dubbed "Otto Von Computer") or two players successively take turns.

Microsoft's *Close Combat* (1996) sets its action in real time, representing armed conflict between the United States' Twenty-Ninth Infantry Division and Germany's 352nd Infantry Division after the Battle of Normandy, without allowing a pause between actions taken. Controlling the movement and battle strategy of their troops, determining how they proceed across the varied landscape and in what ways they attack, defend against, and suppress the enemy, the players of *Close Combat* must also take into account the simulated morale of their soldiers, which can lead to acts of heroism or a descent into shell shock. Such attention to minute details is commonplace in a genre known for both its complexity and its passionate, focused following. *Close Combat* was particularly successful in appealing to this dedicated fanbase, with developer Atomic Games and publisher Microsoft releasing over a dozen sequels.

With a focus less on obsessive strategy and more on outright, immediate violence, World War II first-person shooting games popularized the genre in the 1990s. In Id Software's *Wolfenstein 3D* (1992), players must fight their way out of a Nazi castle in the heart of the Third Reich from a first-person perspective.

Although *Wolfenstein* features horrifying representations of Axis powers, with the player having to defeat a monstrous mechanized Hitler to win the game, later shooters, such as Treyarch's immensely popular *Call of Duty* franchise (begun in 2003) and Electronic Arts' *Medal of Honor* franchise (begun in 1999), emphasize historical fidelity. These games, which rely on the inherently repetitive core mechanic of aiming and firing, nonetheless lay claim to a strong sense of historical realism.

This sense of realism is evoked through the graphical specificity and first-person representation of historical battles, such as the Battle of Peleliu Island and the Battle of Stalingrad in *Call of Duty: World at War* (2008), or the storming of the beaches on D-Day at the beginning of *Call of Duty: WWII* (2017). These games blur the boundary between computer animation, Hollywood film, and documentary with the increasingly accurate depiction of World War II–era weaponry, such as Thompson submachine guns and Mosin-Nagant rifles, with mechanical functionality and aural fidelity emphasized; the incorporation of cutscenes that provide the player with relevant dates, statistics, and archival footage concerning the forthcoming conflicts; and the declaration during the games' credit sequences of the historians, military officers, and veterans consulted during the design process. Over time, the historical detail presented has become increasingly emphatic: in the original *Call of Duty*, cutscenes present two-dimensional maps and a detailed voiceover in which the mission and its importance are carefully described, whereas *World at War*'s cutscenes present sweeping three-dimensional animated maps of the world punctuated with real, grainy film footage of soldiers fighting while oversize statistics regarding weapon production and the war's death toll fill the screen. These shooting games are thus able to intertwine a high degree of factual information with fictional character biographies so as to position their digital, interactive representation of war as a more accurate replication of the conflict.

Recent World War II first-person shooters (FPS) have delved more explicitly into controversial subject matter. *Call of Duty: WWII* requires the player and his or her platoon to liberate a concentration camp, a subject rarely depicted in video games of any genre. And *Wolfenstein II: The New Colossus* (2017) intentionally antagonized conservative Americans through its advertising, imploring them to "Make America Nazi-Free Again," drawing a direct parallel between Donald Trump's supporters and Nazi fascists.

Criticism of World War II video games, beyond highly politicized debates concerning the effects of video game violence, has considered both the ideological effects and historical value of contemporary representations of the war. Multiple scholars criticize World War II games as paeans to militarist ideologies and nationalist jingoism, understanding such games to function as recruitment tools for the U.S. military, imbuing players with a chauvinistic national outlook that supports the military-entertainment industrial complex. Other scholars discuss World War II games as promoting an exploration of the concept of history itself, allowing players to openly explore and alter static, totalizing histories of World War II, the narratives of which frequently remain unquestioned. To these critics, the interactive ability to alter the outcome of major historical events allows the player to investigate and understand the multivalent nature of the history of World War II itself.

Harrison Gish

See also: War

Further Reading

Huntemann, Nina B., and Matthew Thomas Payne, eds. *Joystick Soldiers: The Politics of Play in Military Video Games*. New York: Routledge, 2010.

Stahl, Roger. *Militainment, Inc.: War, Media, and Popular Culture*. New York: Routledge, 2010.

Uricchio, William. "Simulation, History, and Computer Games." In *Handbook of Computer Game Studies*, edited by Joost Raessens and Jeffrey Goldstein, 327–338. Cambridge, MA: MIT Press, 2005.

WoW. See World of Warcraft

Wright, Will (1960–)

William (Will) Wright is an American game designer best known for his *Sim* series of games. Wright was born in 1960 in Atlanta and at age nine moved to Louisiana after the death of his father. Wright graduated from high school at age sixteen and then, over the course of several years, attended Louisiana State University and Louisiana Tech before moving to New York, where he enrolled at the New School in Manhattan. His topics of study were varied and included architecture, engineering, computers, and robotics. In 1981, Wright returned to Louisiana without earning a degree but continued to follow his personal passions and interests.

Wright's earliest design work was completed in 1984 on a wargame for the Commodore 64 home computer system. The game, *Raid on Bungeling Bay* (1984), afforded Wright the opportunity to build maps and create levels. In an interview, when questioned about his experience working on this game, he recalled how building those maps and levels—along with his interest in urban planning—gave him more enjoyment than actually playing the game. Wright formed a company called Maxis Software with game producer Jeff Braun, and in 1989, the world was introduced to *SimCity*. This landmark title afforded players the opportunity to build and run cities and to experience elements of the "god game" genre hitherto unexplored. Newer versions of the game allow players to sculpt mountains and even plan disasters for their cities, but the primary focus of the game centers on direction and management rather than destruction or violence.

SimCity was the first in a series of simulation games that include *SimEarth* (1990), *SimAnt* (1991), *SimLife* (1992), *SimTower* (1994), and the very popular franchise simply called *The Sims* that launched in 2000. Wright's 2008 project, *Spore*, allows players to develop highly complex creatures from microscopic organisms. These titles are some of the highest grossing of all time, and the original *The Sims* game remains in the global top twenty list, boasting more than sixteen million copies sold.

Although the *SimCity* franchise did well for Maxis, Wright and his partner thought the company could not survive on its own, so they sold Maxis to Electronic Arts (EA) in 1997. Wright worked at EA until 2009, when he opted to leave and found *Stupid Fun Club,* a joint venture think tank between himself and EA, which claims on their website to be "an entertainment development studio" focused on "video games, online environments, storytelling media, and fine home care products." At the March 2018 Game Developers Conference, Wright announced a new mobile game project entitled *Proxi*.

Will Wright is known for having a keen eye on the gaming industry. For instance, in a 1994 interview with *Wired* magazine, he predicted that, by 2009, online games would be the norm, and we can now observe the truth in this prediction. His visionary contributions to the god game genre are immeasurable, and his style of blending role-playing with real-time strategy game techniques is used to this day.

Joseph C. DiPietro and Richard E. Ferdig

See also: Maxis Software; *Sim* Series; *Sims*, *The* Series; Simulation Games

Further Reading

Hale, J. "The Sims' Creator Is Making a New Game—With a Super Creepy Twist." *Bustle*, March 23, 2018. Available at https://www.bustle.com/p/what-is-proxi-the-new-game-from-the-sims-creator-will-wright-uses-your-memories-its-so-creepy-8588902.

Kelly, K. "Will Wright: The Mayor of SimCity." *Wired*, January 1, 1994. Available at https://www.wired.com/1994/01/wright/.

King, T. "User-Generated Future for Gaming." BBC News, May 19, 2006. Available at http://news.bbc.co.uk/2/hi/programmes/click_online/4997036.stm.

Wright, Will. "Lessons from Game Design." November 20, 2003. Available at http://web.archive.org/web/20130729222757id_/http://itc.conversationsnetwork.org/shows/detail195.html.

X

XaviXPORT

On September 16, 2005, Nintendo CEO Satoru Iwata announced a revolutionary new console that the company would be introducing the following year. It was so revolutionary that the code name for it was “Revolution.” What was revolutionary about the system was its unique motion sensor controller. After the console was released under the Wii name, it was so successful that Sony and Microsoft released their own motion controllers for their individual systems. But while the Wii was indeed successful, it was not as revolutionary as Nintendo wanted to lead to people to believe. A small Japanese company called SSD Company Limited (SSD was short for Shinsedai, Japanese for “A New Generation”) actually released a similar console, the XaviXPORT, in August 2004, roughly about the same time that Iwata was introducing the Wii. But while the XaviXPORT was its first console, the company had been releasing motion sensor products a half decade before that.

The Japanese company, based in the Shiga Prefecture, had been founded by an electronics engineer named Katsuya Nakagawa on December 1, 1995. Prior to starting his own company, Nakagawa had been an engineer at Nintendo, where he had codeveloped twenty patents that had been assigned to the company. Nakagawa brought seven of his Nintendo engineering colleagues with him to his new venture. SSD’s mission was to use their specialty digital technology for the benefit of society. As a means to this end, they developed what they called XaviXTechnology, which combined human interface sensors, including optical and infrared sensing, which allowed any television to respond directly to the user’s actions.

One of SSD’s first products was *Excite Stadium*, which was licensed to Epoch and released in Japan in 2000. Innovative at the time, the *Excite Stadium*, was one of the first plug-and-plays (a small console that plugged into a television and was ready to play with built-in games). The base unit actually looked like a rectangular base from a baseball diamond. A baseball peripheral was attached to it that allowed the player to “pitch” a physical baseball during a game. Wireless sensors within the ball communicated with the base unit and provided such information as the type and speed of the pitch. A bat that also connected to the base unit via sensors was also provided. *Excite Stadium* allowed people to pitch and hit as if they were in a real game while the rest of the team played on-screen. Radica Games released *Excite Stadium* under the name *Play TV Baseball*[2] in the United States.

SSD went on to develop and license dozens of games that utilized its proprietary XaviX Technology, but it never released anything under its own brand name. That changed after SSD developed a new console that employed the XaviX Technology. The result was the $79.99 XaviXPORT, which was released in September 2005. This new system offered players a video game version of baseball that used physical objects, such as a bat and ball, much like SSD's earlier *Play TV Baseball2*. However, while the dedicated *Play TV Baseball2* could only play one game, baseball, the XaviXPORT was capable of playing many different games with the switch of a ROM cartridge.

Each of the game cartridges contained its own proprietary XaviX multiprocessor. The advantage of this was that as new games were developed, they could benefit from having more sophisticated processors without the console itself requiring upgrades. The chips in the first three XaviXPORT cartridges used 8-bit 6502 multiprocessors, which were the same processors that had been used in the Nintendo Famicom. And the results were evident. Critics were less than impressed with the system's graphics and sound capabilities, which they compared to the ten-year-old Super Nintendo Entertainment System (SNES) and the SEGA Genesis.

Despite the low-quality graphics and sound, critics praised the innovative controls of the XaviXPORT. The game library was small, but each game cartridge was packaged with its own unique controller. And while the controllers were indeed distinctive, the mechanics of the system were even more so. The wireless controllers were not connected to the console, which used optical sensors and infrared technology to detect the player's movements and, in turn, respond to the speed and direction of the player's motions.

The initial games for the XaviXPORT were sports games, each packaged with its own unique and innovative controller: *XaviX Golf* (2005) came with a driver and a putter, *XaviX Bass Fishing* (2006) was packaged with a fishing rod controller, *XaviX Baseball* (2006) came with a baseball bat controller, *XaviX Bowling* (2007) had a bowling ball, and *XaviX Tennis* (2007) was packaged with a tennis racquet controller. In addition to sports games, SSD also developed and released two titles that dealt with body fitness. Both were endorsed by and featured actor and martial artist Jackie Chan and were part of a series called *Jackie Chan Studio Fitness*: *Powerboxing* (2005), which was packaged with a pair of boxing gloves. The other title, *J-Mat* (also known as *Aerostep* [2005]), was a mat that users stepped on for cardiovascular exercises. The package also came with two hand weights that were used in some of the exercises.

In 2006, SSD repackaged the *J-Mat* as the Step Sensor and sold it without the cartridge or the weights. Only one product was ever released for use with the Step Sensor, *Music & Circuit* (2007). In addition to a cartridge, *Music & Circuit* came with a cable to connect a multimedia device, such an MP3 player, to the XaviXPORT, allowing people to exercise in sync with their own music while using the Step Sensor.

SSD developed an additional fitness program, *XaviX Lifestyle Manager* (2006), which was packaged with a wireless scale that sent data to the XaviXPORT system for weight trends, BMI body fat percentage, and lifestyle analysis. Also included were warm-up circuit trainings and cool-down exercises.

The final software released by SSD was *Eyehand* (2008), which was packaged with two "glove sensors" that allowed the user's hands to act as controllers for minigames displayed on the television screen. One such game involved the player catching on-screen butterflies. The player waved his or her palms, which were represented on-screen as circles, and when the player moved a circle around a butterfly and closed his or her hand, a butterfly was caught. The object was to catch as many butterflies as possible.

The console found it difficult to compete with the major consoles; neither SSD nor the XaviXPORT had any name recognition, especially since the console was completely devoid of a marketing campaign. And the few stores that carried it, mostly stores that did not carry other video game consoles, usually treated it as a novelty item. Three additional titles, *XaviX Hot Plus*, *XaviXmobile Atama Club*, and *XaviX PowerKIDS*, were exhibited at the Tokyo Game Show in 2009, but they were never released.

Following its experiment with a console marketed under its own brand name, SSD returned to creating unique electronics toys that were sold by other companies and continued to do so until 2010. On September 13, 2009, the company introduced *The Body Conditioner*, a motion analysis system. The company displayed it over the next two years, but there is no evidence that the unit was ever released. In 2011, SSD stopped maintaining its corporate website but continued sell its XaviXPORT at a greatly discounted price through a different site: xavixstore.com. That site was offered for sale on January 15, 2015, and was no longer supported by SSD.

Leonard Herman

See also: Generations of Technology

Further Reading

Herman, Leonard. *Phoenix IV: The History of the Videogame Industry*. Springfield, NJ: Rolenta Press, 2016.

SSD Company Limited website. Accessed October 3, 2020. Available at http://www.shinsedai.co.jp/index_e.html.

Xbox. *See* Microsoft Xbox

Xbox Game Studios

Xbox Game Studios is a division of Microsoft that produces games for the line of Microsoft Xbox console systems. The company was previously known as Microsoft Games (2000), Microsoft Game Studios (2001–11), and Microsoft Studios (2011–19), and as of 2019, it was the parent organization of fifteen game development studios. The company also owns the *Age of Empires*, *Gears of War*, *Halo*, *Minecraft*, *Microsoft Flight Simulator*, and *State of Decay* franchises.

Microsoft Games began in 2000 and was formed from an internal games group at Microsoft that made games for Microsoft Windows. It was formed around the same time that the Microsoft Xbox home console system was announced, and it began to develop games for the console. Microsoft Games first acquired Bungie during the time the studio was working on *Halo: Combat Evolved* (2001), which became an Xbox exclusive game. In 2001, Turn 10 Studios was started for the *Forza* series of racing games, and that same year, Microsoft Games was renamed Microsoft Game Studios.

In 2002, Microsoft Game Studios acquired Rare, which had been founded in 1985 and was known for making games for Nintendo, and in 2004, it started Carbonated Games for the making of casual games. Microsoft Game Studios acquired Peter Molyneux's Lionhead Studios in 2006 (it would be closed ten years later), and in 2007, Bungie left Microsoft to become a privately held company again. Bungie would continue to make *Halo* games for Microsoft, but the latter company owned the franchise. Microsoft would later start 343 Games to work on further *Halo* titles.

In 2008, Carbonated Games was closed, and Xbox Live Productions was announced as a new studio. In 2009, the company acquired Canadian studio BigPark, and in 2010, it established MGS Mobile Gaming to produce mobile games.

Microsoft Game Studios was renamed Microsoft Studios in 2011, and it acquired Twisted Pixel Games that same year and developer Press Play in 2012. Twisted Pixel would later leave Microsoft in the fall of 2015, and Press Play would be closed in 2016. In 2014, Microsoft Studios bought several franchises, including the *Gears of Wars* series, the *Rise of Nations* series, and the *Rise of Legends* series, and it also bought the Stockholm-based developer Mojang, along with its popular *Minecraft* franchise, for $2.5 billion.

Microsoft Studios continued buying studios in 2018, acquiring Compulsion Games, Ninja Theory, Playground Games, Undead Labs, Obsidian Entertainment, and inXile Entertainment and, in 2019, the studio Double Fine. Finally, on February 5, 2019, Microsoft Studios was rebranded as Xbox Game Studios to emphasize the console line and its games and other supported devices.

With the continuing support of software giant Microsoft and, as of 2019, being the only major home console system from an American company, Xbox Game Studios seems well positioned to be a major player in the video game industry into the future.

Mark J. P. Wolf

See also: Microsoft Xbox; Microsoft Xbox One; Microsoft Xbox 360

Further Reading

Sarkar, Samit. "Microsoft Officially Owns Minecraft and Developer Mojang Now." Polygon, November 6, 2014. Available at https://www.polygon.com/2014/11/6/7167349/microsoft-owns-minecraft-mojang-acquisition-closes.

Stevens, Colin. "Microsoft Studios Is Now Xbox Game Studios." IGN, June 21, 2019. Available at https://www.ign.com/articles/2019/02/05/microsoft-studios-is-now-xbox-game-studios.

"Xbox Game Studios," Wikipedia. Last edited October 1, 2020. Available at https://en.wikipedia.org/wiki/Xbox_Game_Studios.

Xbox 360. *See* Microsoft Xbox 360

Xiaobawang System

The Xiaobawang system is a computer-learning machine that offers a combination of functions, including typewriter, game console, and personal computer. The technology for the system's early model, which was called the "Red-White Console" in China, was actually cloned from the Nintendo Famicom (later renamed the Nintendo Entertainment System [NES] for its North American release). Many people from the generation that grew up in China during the 1980s and 1990s have fond memories of playing *Super Mario Bros.* (1985), *Contra* (1987), and *Double Dragon* (1987) using this system.

The early model of the Xiaobawang system had yellow cartridges that contained between forty and one hundred well-known games from Japan and the United States. Compared to gaming consoles from Japan, prices for the system were within the affordable range of ¥100–¥500. In addition to its word processor and keyboard, which allowed children to practice typing in both Chinese- and English-language scripts, the Xiaobawang system functioned as a calculator, message board, and music keyboard, which allowed easy coding, computer chatting, and music composition.

An overview history of the Xiaobawang system's development reveals the beginning of gaming culture in China before the 2000s. Branding itself as an educational technology company, the company Xiaobawang (also called Subor) strived to develop during an era of political reform that called for opening the country's internal market. The company received its license approval from the State Administration for Industry and Commerce. In 1987, its founders created Xiaobawang under its initial name, the Fuzhou Waixing Computer Science and Technology Company. At that time, the country's high price barrier and restrictive import regulations prevented franchised Japanese games and electronics from gaining access to the Chinese market.

Such a business environment benefited the market growth of domestic firms like Xiaobawang, which used the opportunity to successfully distribute its system widely using celebrity promotion through public media channels. One notable example is Jackie Chan's advertisement endorsement, which appeared on China's most authoritative media channel, China Central Television (CCTV). By 1991, Xiaobawang had become the number one video game manufacturer in China. Sales of its system amounted to 70 percent of the national market. By 1994, its revenue had grown to four billion Renminbi (Beijing News 2018).

However, by the late 1990s, growing parental concern began to pose a challenge to the company and its popular system, as the voice of growing parental concern in Chinese society began to characterize gaming as electronic heroin for schoolchildren. The Ministry of Culture announced it would enforce the government Game Machines Sales Ban in June 2000. The law put an official prohibition on the sale, import, and manufacture of gaming consoles. In response, the company was compelled to stop its operation of the Xiaobawang gaming business. The sales of the Xiaobawang system declined, and the company diverted its production focus to other areas of industry, such as personal computers, audiovisual appliances, home electronics, cell phones, and tablets (Xiaobawang 2019).

The Xiaobawang system has evolved over its twenty years of existence into a variety of models, such as the SB-218, SB-286, SB-486D, SB-926, and SB-986, which reveals a continuous progression from the original Famicom game console to personal computers and other new technologies. In 2016, the Chinese government, which had lifted its ban on consoles, inspired Xiaobawang to return to China's gaming market. In response, in 2018, the company introduced a new model, the Z+ New Gaming Computer. In this recent comeback, developers of the Xiaobawang system have focused on creating a gaming environment compatible to Windows 10 and virtual reality (VR) technology. The transformation is expected to shift Xiaobawang's development focus to a system that allows the company to compete in the high-end gaming products market, which demands high-quality visuals and improved product design. This expanded range will make it possible for Xiaobawang gamers to play esports titles such as *Defense of the Ancients* (2003) and *PlayerUnknown's Battlegrounds* (2017). The company also collaborates with Sony and independent Chinese game developers to publish copyrighted titles, including *Double Dragon IV* (2017), *On Rush* (2018), and *Bloody Spell* (2019).

Peichi Chung

See also: China

Further Reading

Beijing News. "Thirty Years from Peak to Decline: Can 'Xiabawang' Change to Become Glory of the King?" Tech.sina.com, June 1, 2018. Available at http://tech.sina.com.cn/it/2018-06-01/doc-ihcikcev7630603.shtml.

Xiaobawang. "Company Introduction." 2019. Available at http://www.subor.com.cn/about.asp?id=39&Str=公司简介 (site discontinued).

XNA

Microsoft XNA is a software platform used to ease the development of video games for the Microsoft Xbox 360 and other Microsoft platforms; however, the company discontinued support for XNA in 2013 as Microsoft transitioned and replaced development tools in preparation for Windows 8 and Xbox One. XNA provides a set of tools, services, and resources designed to help simplify game creation for professional, student, and hobbyist developers. XNA is typically used to refer to several elements: the XNA Framework, XNA Game Studio, and the XNA development community. XNA was announced in 2004 at the Game Developers Conference (GDC) and was released at the 2006 GDC. XNA is a recursive acronym, standing for "XNA's Not Acronymed."

XNA marks a deviation from historically restricted development for other game consoles, which have typically required developers to buy more expensive development console systems and specialized tools directly from the console manufacturer. In contrast, XNA developers may test their games on retail consoles.

The production of unofficial content for a console system is often prohibited by the console manufacturer, which seeks to regulate content and license game production to share in a game's potential profits. Such noncommercial games for console and handheld systems are called *homebrew games*, and although consumers have produced such content for other console systems, XNA is the first homebrew development platform sanctioned by a console developer.

The XNA Framework is a software development kit (SDK), which is a collection of programming elements for routine functionality that can be combined to make more complex programs. For instance, XNA streamlines the processes for displaying graphics on the screen, playing sounds, and performing other commonplace game functions. In this way, XNA functions as an application programming interface (API), serving as a software framework to facilitate and speed game development by simplifying the software code in which the games are written. Programs in the XNA Framework are primarily written using Microsoft's XNA Game Studio software using the C# language.

The XNA Game Studio software is a development environment specifically designed for the creation of XNA content built on top of Microsoft's Visual Studio development environment. The first version, XNA Game Studio Express, was made available in 2006, with XNA Game Studio 2.0 released in 2007 and subsequent versions similarly titled. The company operated XNA Creators Club Online, an official XNA community website, through which XNA developers submitted and shared their own games and played and reviewed the games of other XNA content creators. Microsoft ensured that games made with XNA could be easily ported between multiple Microsoft platforms, and game creators could sell their games for the Xbox 360 via the Xbox Live Indie Games service.

Microsoft's robust community support for XNA paved the way for its ongoing legacy as developers active in the XNA community built upon XNA. After Microsoft announced its discontinuation of support for XNA in 2013, developers continued to use XNA and adapted it to new frameworks and tools for game development. One notable example is the open-source MonoGame, a C# implementation of the XNA 4 Framework, which allows developers to design games in a single environment. MonoGame facilitates readily porting games to multiple platforms beyond Microsoft's, including Android, iOS, MacOS, and consoles such as PlayStation 4, the Nintendo Switch, and Xbox One.

Christopher Hanson

See also: Homebrew Games

Further Reading

Miles, Rob. *Introduction to Programming through Game Development Using Microsoft XNA Game Studio*. Redmond, WA: Microsoft Press, 2010.

MonoGame website. Accessed October 3, 2020. Available at http://www.monogame.net/.

Reed, Aaron. *Learning XNA 4.0: Game Development for the PC, Xbox 360, and Windows Phone 7*. Sebastopol, CA: O'Reilly Media, 2010.

Van Zelfden, N. Evan. "The DNA of XNA." The Escapist, August 7, 2007. Available at http://www.escapistmagazine.com/articles/view/issues/issue_109/1333-The-DNA-of-XNA.

Y

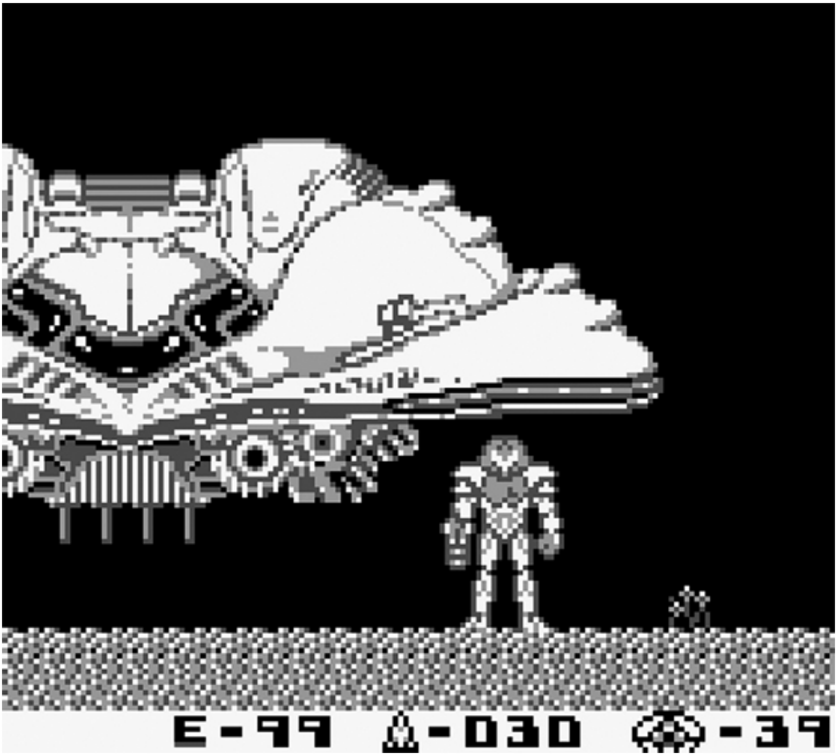
Yokoi, Gunpei (1941–97)

Born September 10, 1941, Gunpei Yokoi was one of the architects of Nintendo's dominant position within the video game industry during the late 1980s and early 1990s. He is most frequently associated with the creation of both the company's seminal handheld gaming device, the Nintendo Game Boy, and of one of its flagship game franchises, *Metroid*.

Upon his graduation from Doshisha University in 1965 with a degree in electronics, Yokoi took a position at the then toy manufacturer, where he would devise numerous mechanical toys, tools, and novelties before creating Nintendo's first handheld video game device in 1980, the Game & Watch LCD game. Conceived as a low-cost alternative to direct competition with dominant console manufacturers such as Atari and Mattel, more than sixty Game & Watch models were produced over the following decade, a period that also saw the 1983 debut of Nintendo's Famicom (rechristened the Nintendo Entertainment System [NES] for its 1985 Western release). The console was designed by Masayuki Uemura, a personal hire of Yokoi's, who himself developed a successful peripheral for the NES, the Robotic Operating Buddy, or R.O.B. The appeal of Yokoi's device helped assuage American consumers' skepticism in a new video game console following the industry crash of 1983. Yokoi would also personally spearhead the development of two of the NES's most beloved games, *Metroid* (1986) and *Kid Icarus* (1987), as producer.

With Nintendo's place in the home console market firmly secured, Yokoi's most famous creation, the Game Boy, would ensure the company's dominance in the handheld sector for decades to come. Released in 1989, the Game Boy boasted a two-inch monochrome screen and mono audio. It could be played for up to thirty-five hours on four AA batteries and was sold bundled with Alexey Pajitnov's addictive puzzle game, *Tetris* (1985). This sensation, along with Yokoi's own handheld iteration of Nintendo's flagship character, *Super Mario Land* (1989), drove sales of the original Game Boy to more than fifty million units. Yokoi would develop two *Mario Land* sequels, *Super Mario Land 2: Six Golden Coins* (1992) and *Wario Land: Super Mario Land 3* (1994), for the Game Boy as well as a sequel to his second most famous creation, *Metroid II: Return of Samus* (1991).

Super Metroid, widely revered for its evocation of mood and place, followed on the Super Nintendo Entertainment System (SNES) in 1994. In 1995, however, Yokoi's next invention, the ill-fated Nintendo Virtual Boy, was widely regarded as a colossal failure. The device's stand-mounted visor design and red monochrome screens prompted complaints of physical discomfort among the gaming press and complete indifference from the buying public. With the majority of Nintendo's resources focused on the 1996 launch of the Nintendo 64, the Virtual Boy became an embarrassment to Yokoi, and he left the company later the same year. Forming a new company under the name Koto Laboratory, Yokoi began work on a new handheld device that would ultimately be released in 1999 as Bandai's WonderSwan.



Two of Yokoi's most enduring creations: bounty hunter Samus Aran appears in Yokoi's *Metroid II: Return of Samus* (1991) for the Nintendo Game Boy, which was also designed by Yokoi. (Courtesy of Mark J. P. Wolf)

Tragically, Yokoi would not live to see the WonderSwan's completion. On October 4, 1997, Yokoi and his business associate Etsuo Kiso were struck and killed by a car on Japan's Horukiko Expressway after being involved in a minor collision.

Ben Gill

See also: Nintendo; Nintendo Game Boy

Further Reading

Game Informer Staff. “Forgotten Giant: The Brilliant Life and Tragic Death of Gunpei Yokoi.” *Game Informer* 105 (2002): 116–117.

YouTube

YouTube is a video-sharing website that was created in 2005 by Chad Hurley, Steve Chen, and Jawed Karim, three former employees of the online banking website PayPal. Originally, its purpose was to let anyone upload and share video content easily over the internet as well as integrate it on then budding blogging websites and create communities around this content. After quick early growth, it was bought and expanded on by Google in 2006. Its videos are often published by individuals, though it is also used by companies for promotion or diffusion of content, and the videos can be monetized through the use of advertisements. This business model meant that, over time, the website acted as a real television network, with its stars and recurring series kept afloat by their popularity, though YouTube itself does not contribute to the content directly.

YouTube features have included different platforms divided by type of content (for children, video games, etc.), livestreaming, and paid-for channels in a subscription model. This platform is significant for video game–related content, as these videos and channels are among the most popular on the website, and many different types of content featuring video games have emerged there over time. The popularity of YouTube and its video game–related content has contributed to changes in the marketing of the games themselves, as it became more and more important for developers to have their creations showcased by the website’s stars, often dubbed “YouTubers” or “influencers.”

Over time and as YouTube grew in popularity, several different genres of video game–related content emerged. Longplays, a video equivalent to text-based walkthroughs, showcase a game from its beginning to its end, often for informational or archival purposes. Their presentation is usually sober, so as to present a game as purely as possible, without overlaid commentary. Speedruns feature a player attempting to complete a game as fast as possible, and esports videos present entire tournaments or simply highlights of an event or a specific player in competitive gameplay.

Let’s Play videos might, however, be the core of YouTube’s video game–related content in terms of popularity. For these, the creators tend to take a more active stance, commentating on their performance or critiquing the game as they play. Their purpose can be various, from pure entertainment to showcasing certain games or techniques within them. Another purpose of Let’s Play videos might be to put the game in context: to bring the viewer from an incomplete understanding of a game to a more complex and well-rounded one. This content format originated from the forums of an internet community named Something Awful, where game events were made and commented on via text and screenshots. This type of Let’s Play video ended up forming a community (the Let’s Play Archive) on its own rather than being spread across forum posts; but these were eventually mostly superseded by the video format of YouTube.

Ss video game–related content became monetized and, for some, a main source of income, several legal issues have emerged over the status of the video game as a creator's platform for expression. These issues echoed other copyright litigation against YouTube throughout the years with television and film conglomerates as well as the online platform's well-known Content ID system. Due to the sheer amount of content uploaded to the website, automation had to be used to ensure that videos complied with copyright law, which resulted in debates in its community as well as false reports and abuses. Video game content creators, who do not technically own the game content itself, have been the target of game developers and publishers in litigation as well, but it has also been uniquely argued that the video content creators express their creative impulse through the game and that that, by itself, creates entirely new content. The complexity of this issue has left it in a legal gray zone, but monetization and creation of this content has generally been allowed, especially as developers gained benefits from the marketing effect of content creators' popularity—an effect that might have been more easily noticed by a medium more in touch with the internet and new distribution methods.

Finally, this platform has been described as a "cultural archive"—as containing a repertoire of curated content preserved online—both provided by content owners such as labels publishing their own back catalogue and by amateur archivists publishing their collections. This "living archive of contemporary culture from a diverse range of sources" (Burgess and Green 2018, 135–136) extends to video games, with efforts to preserve older games and hardware. Although this medium is a good fit for video games' audiovisual content, it does little to preserve its gameplay. As such, it is not usually seen as an archive on its own, rather as a tool that can be used by video game historians to preserve at least part of those experiences. However, as much of this content is in the hands of many companies, historians, and archivists, it is also prone to sudden content deletion. Popular video game content channel Machinima, for example, after being bought out, removed years of content from the website, denying public access to it for academics and historians alike. As useful as a resource like YouTube might be, then, it remains unstable and ever shifting, a heritage of its early days as a mostly social endeavor.

Ophélie Bernard

See also: Let's Play Videos; Social Media; Speedruns; Streaming

Further Reading

Burgess, J., and J. Green. *YouTube: Online Video and Participatory Culture*. 2nd ed. Cambridge, MA: Polity Press, 2018.

Hagen, D. "Fair Use, Fair Play: Video Game Performances and 'Let's Plays' as Transformative Use." *Washington Journal of Law, Technology & Arts* 245 (2018). Available at https://digitalcommons.law.uw.edu/wjlta/vol13/iss3/3/.

Kunzelman, C. "A Good Let's Play Is More Than Just a Video of Your Favorite Game." Vice, November 16, 2018. Available at https://waypoint.vice.com/en_us/article/nepzwb/a-good-lets-play-is-more-than-just-a-video-of-your-favorite-game.

Z

Zapak (Portal)

According to the company's website, Zapak Digital Entertainment Ltd. is one of India's largest gaming companies that addresses the complete value chain of digital gaming. With ten million registered gamers, Zapak.com claims to be the largest casual gaming site in the country and among the top casual gaming sites in the world. The company describes itself as the only portal in the world that offers games across all genres: single-player, multiplayer, downloadable games, kids' games, girls' games, and cricket games (a very popular genre in India), among others. The company distributes its games in the United States, Europe, South Africa, Australia, the Middle East, and Asia.

As of 2013, the company announced having passed the 100 million user downloads mark from all of its game titles on the Nokia Store (with over 350 of Zapak's own game titles). At the time, its most popular game was *T20 Cricket 2012* (2012) with 7.76 million downloads. The company is known for games such as *Speedway Racing*, *Stealth Sniper*, and *Super Boxing*. In the summer of 2018, Zapak launched *Little Singham*, a mobile game (free to play on the Google Play Store), which garnered over 3 million downloads and became a top game in India.

Zapak is a unit of Reliance Games, which belongs to Reliance Entertainment. (Reliance Games provides music, sports, and internet and mobile portals as well as user-generated content, but Reliance Entertainment does not break down its revenues. The company also acquired the U.S. animation studio DreamWorks in 2009.) Zapak was created in 2006 by Venkatarao Ponnada, Shibasish Sarkar, and Amit Khanduja. The following year, it introduced Zapakmail, a fast e-mail service, but it discontinued the service two years after. In 2010, games were made available on Facebook. In 2011, it launched Zapak Plus, the first subscription-based gaming model in India.

The mother company had consolidated its gaming business in 2012; it was spread across Zapak and Jump Games brands and rebranded as Zapak Mobile Games. As of December 2018, most of its traffic originated from India (nearly 87%) followed curiously by Greece with 6 percent (Alexa 2018). In 2015, the mother company sold off 10 percent of its stake to China-based Lead Eastern Group for $15 million, creating a three-way joint venture between Reliance Games, Lead Eastern (a publicly listed Chinese company invested in gaming, film, and television production and part of Lead Holding), and Creative Cultural (a Hong Kong firm engaged in intellectual property–based entertainment, including gaming). The deal valued Zapak at $150 million.

Zapak has a WAP (wireless application protocol) site called m.zapak.com, which is one the world's first multiplayer platforms for smartphones. It offers over twelve hundred free games and boasts of over two million unique visitors every month. Zapak Games, the licensing and merchandising arm of Zapak, has created one of India's largest retail distribution networks, with presence in over five thousand retail outlets across one hundred cities across India. The company operates high-speed gaming cafés as Zapak GamePlexes. Zapak also launched multiple game zones at Fun Republic malls in Chandigarh, Ahmedabad, Lucknow, and Mumbai.

Zapak has strong content partnerships in the mobile and PC gaming spaces and works closely with most of the leading global gaming and entertainment players, such as Microsoft, PopCap, Boonty, PlayFirst, Universal Studios, Shanda, Cartoon Network, THQ, iPlay, and Hands-On. Backed by the holding company Reliance Entertainment, Zapak seems to be in a good competitive position to benefit from the growth of the Indian gaming market. India is now one of the top five markets for mobile gaming in terms of number of users (Laghate 2018); the expanding smartphone user base and rising internet penetration are the key driving factors for this growth (Simon 2018).

Jean Paul Simon

See also: India

Further Reading

Alexa. "Zapak.com." 2018. Available at https://www.alexa.com/siteinfo/zapak.com.

Dangi, S. "Zapak.com: A Case Presentation." September 28, 2011. Available at https://www.slideshare.net/shreekanthdangi/zapak-9457046.

Laghate, G. "India among Top 5 Markets for Mobile Gaming." *Economic Times*, August 14, 2018. Available at https://economictimes.indiatimes.com/tech/software/india-among-top-5-markets-for-mobile-gaming/articleshow/65396386.cms.

Newzoo. *2018 Global Games Market Report*. 2018. Available at https://resources.newzoo.com/hubfs/Reports/Newzoo_2018_Global_Games_Market_Report_Light.pdf?submissionGuid=d9993054-93b4-4ada-9eb5-6090fa0717e7.

Simon, J. P. "Triggering the Emergence of Digital Ecosystems: The Role of Mobile and Video Games in Emerging Economies." *Digital Policy, Regulation and Governance* 20, no. 5 (August 13, 2018): 449–478. Available at https://doi.org/10.1108/DPRG-03-2018-0008.

Zapak.com website. Accessed October 3, 2020. Available at http://www.zapak.com/.

Z-Axis Depth

Video games use techniques found in other graphical media for suggesting depth into the picture plane (i.e., along the z-axis): overlap, apparent size, linear perspective, foreshortening, texture gradients, aerial perspective, shadowing, parallax, and the rotation of objects. The use of these techniques depends on the state of available technology and game design, which determine what can be put into practice.

Early games, with their simple graphics, were unable to achieve much illusion of depth. Overlap and apparent size were used, but the simple shapes and few colors available made it difficult to counter the screen's flatness. Attempts at linear perspective came in 1976, when racing games such as *Datsun 280 Zzzap* and *Night Driver* both featured small white rectangles arranged to suggest roadside pylons that defined a roadway extending toward a vanishing point. Scalable sprites, introduced in the 1970s, also helped smooth changes in apparent size. Advances during the 1980s, including higher-resolution imagery, texture gradients, and more available colors, increased the amount of graphical detail and made subtler depth cues possible, creating a better illusion of depth in game imagery.

True three-dimensional computation, which rendered views of scenes produced with three-dimensional coordinate systems, first appeared commercially in vector games such as *Speed Freak* (1978), *Barrier* (1978), and *Battlezone* (1980). The first three-dimensional game with filled-polygon graphics was *I, Robot* (1984), but its graphics were simple and abstract; it would not be until the late 1980s that games with three-dimensional filled-polygon graphics would appear regularly.

While games awaited the computing power necessary for true three-dimensional graphics, other design strategies were used to simulate depth. Shifting, overlapping planes could produce a parallax effect, as in *Moon Patrol* (1982). Sprites were detailed enough to allow characters to appear in different positions, making them look more dimensional. Large numbers of sprites could be scaled to produce a three-dimensional feel, as in *Pole Position* (1982) and *Space Harrier* (1985). A few games were 3-D through the use of stereo images, such as *Subroc-3D* (1982). Axonometric projections gave graphics a three-dimensional feel without any three-dimensional calculations, as in *Q*bert* (1982) and *Crystal Castles* (1983). Images with first-person perspectives were used in *Maze War* (1974) and *Spasim* (1974), and pre-rendered three-dimensional imagery was used in laserdisc games and early CD-ROM-based games. Each of these methods, however, had its limitations, and none of them allowed dynamic, interactive camera movement in real time.

With the advent of true three-dimensional computation done in real time, interactive three-dimensional environments became possible, and the z-axis depth they generated was based on a three-dimensional coordinate system that made their spaces look more realistic. Computer graphics advances such as the z-buffer helped to reduce the amount of processor speed and memory needed to produce imagery with depth, but both still limited what was possible. Sight lines extending too far into the distance made render time too slow for real-time interaction. Thus, games had to limit the amount of depth in the player's view; for example, the first two *Grand Theft Auto* games had an overhead view of the street to limit what needed to be rendered. Other games designed their landscapes or building interiors with limited visibility, so only a small portion of the world can be seen at any given time. Devices such as fog, shadow, and exaggerated aerial perspective obscured visibility beyond a certain distance, as in games of the *Tomb Raider* and *Silent Hill* series. As computing power increased, depth-obscuring devices became less necessary. Methods that reduce render time are still used, however, such as NURBS, nonuniform rational basis (or Bézier) splines, which dynamically reduce an object's polygonal resolution as it moves into the distance, reducing the number of polygons needed to be rendered.

Z-axis depth is necessary for a strengthened illusion of a real three-dimensional space, and although it places demands on hardware, software, and game design, it fills the player's viewpoint with a larger and more detailed world of interconnected locations, adding to a game's verisimilitude and encouraging player involvement.

Mark J. P. Wolf

See also: Dimensionality; Graphics

Further Reading

Wolf, Mark J. P. "Z-Axis Development in the Video Game." In *The Video Game Theory Reader 2*, edited by Bernard Perron and Mark J. P. Wolf, 151–168. New York: Routledge, 2008.

Zaxxon

SEGA's *Zaxxon* was released in January 1982 amid a deluge of space-themed shooting games that appeared in the late 1970s and early 1980s. Space battles figured in games from very early on, including *Spacewar!* (1962) and the arcade cabinet games *Computer Space* (1971) and *Galaxy Game* (1971). The very popular *Space Invaders* (1978) was followed by *Galaxian* (1979), *Phoenix* (1980), *Defender* (1981), and *Galaga* (1981), among others. During this period, space shooters were fertile ground for experimentation in game form. *Galaxian*, *Galaga*, and *Phoenix*, for example, featured innovations such as parallax depth effects, variation in enemy behaviors, and, in *Phoenix*, boss battles.

While it integrates many of these innovations, *Zaxxon* is most notable for its pioneering use of isometric graphics (specifically, a dimetric projection) and shadows to create an illusion of three-dimensional space. In most games before *Zaxxon*, only one plane of each object would be visible. Thus, a spaceship was typically shown from above, as in *Galaxian*, or from the side, as in *Defender*. *Axonometric projection*, the term from which the title *Zaxxon* is derived, describes perspectives in which multiple planes of objects are simultaneously visible. In the variety known as *isometric perspective*, the x, y, and z axes are separated by equal angles, creating an appearance of depth with no horizon line or vanishing point. While technical limitations inhibit true isometric perspective in raster graphics, the term is commonly used for the (technically dimetric) approximations of isometric perspective achieved by games like *Zaxxon*. With its emphasis on schematic proportionality over diegetic verisimilitude, isometric perspective has ultimately proved more popular for strategy games such as *Populous* (1989) than it has for action games.

Players of *Zaxxon* control the position, but not the velocity, of a colorful spaceship as it negotiates an indefinitely repeating level structure. The ship first infiltrates an airstrip that seems to be installed on a floating space rock. The primary challenge of this stage is avoiding objects and walls while traversing the airstrip. In this respect, the game's isometric perspective becomes a challenge in itself, as it can be difficult to judge altitude without a vanishing point; to compensate, *Zaxxon* provides an altimeter at screen left and a shadow that expands as the ship's altitude decreases. The second phase of each level depicts space combat against advancing waves of enemy ships, which can themselves move up and down as well as left to right in game space. Finally, the ship infiltrates a fortress and does battle against a giant robot. When the robot retreats or is destroyed, the process repeats.

Zaxxon was very popular at the time of its release, owing in part to an unprecedented television campaign for an arcade game, and it was ported to a number of home consoles. Perhaps most notably, a SEGA Master System port of the game continued *Zaxxon*'s experimentation with optical perspective, trading isometric projection for vanishing point perspective, compatible with the Master System's stereoscopic 3-D glasses peripheral.

Daniel Reynolds

See also: Arcade Games; Dimensionality; Z-Axis Depth

Further Reading

Arsenault, Dominic, Pierre-Marc Coté, and Audrey Larochelle. "The Game FAVR: A Framework for the Analysis of Visual Representation in Video Games." *Loading . . . The Journal of the Canadian Game Studies Association* 9, no. 14 (2015): 88–123.

Marbach, William D. "A New Galaxy of Video Games." *Newsweek*, October 25, 1982: 123–125.

Wolf, Mark J. P., ed. *The Video Game Explosion: A History from PONG to PlayStation and Beyond*. Westport, CT: Greenwood Press, 2007.

Zeebo

The Zeebo is a 3G-enabled game console that was introduced in Brazil and Mexico in 2009. The development of the Zeebo console began as a partnership between California-based Qualcomm and Brazil-based Tectoy. Executives that included Reinaldo Normand, Mike Yuen, and John Rizzo oversaw the initial launch of the console at the Game Developers Conference (GDC) in San Francisco in March 2009. Initial tech press and blog accounts called the Zeebo the console for the "next billion" gamers.

The original impetus behind the Zeebo console was Reinaldo Normand's desire to create a console that would be affordable for middle-class families in emerging markets (Hall 2009). Zeebo pursued partnerships with local wireless carriers, such as Claro, using a 3G connection bundled with the console as a way to distribute games digitally, avoiding distribution problems posed by the geographic limits of broadband infrastructures. Zeebo's corporate leaders also considered digital distribution via 3G networks as a way to curtail rampant piracy. Games were released in BREW (binary runtime environment for wireless), which led some critics and players to argue that the Zeebo was not a game console in the traditional sense but a glorified cell phone.

Because of lackluster sales and problems in establishing game markets in Latin American markets, the Zeebo has recently been repositioned as an educational platform. Part of the failure of the Zeebo may be due to the fact that major game publishers and developers used the system to port titles and as a way to monetize back catalog titles. Although the system was more affordable than legal versions of current consoles, it was only slightly cheaper than pirated versions of the Microsoft Xbox 360 and the Sony PlayStation 3 that allowed game players to access current titles (also available on the black market). Despite problems with the console, independent developers and Latin American developers expressed enthusiasm over the emergence of a new platform that might allow them new forms of access to consumers—unlike the licensing arrangements and complicated approval processes associated with the big three consoles and the Apple iPhone.

Corporate restructuring has shifted the Zeebo from being a game console designed for entertainment to a platform designed to improve educational access and literacy; however, the Zeebo's introduction as a new console illustrates the need to develop more nuanced accounts of cultural differences in gameplay and how transnational and global accounts of gaming industries and cultures must move beyond a focus on the big three markets of the United States, Japan, and Europe.

Ben Aslinger

Further Reading

Covert, Adrian. "Tectoy Zeebo Gaming System Uses Free 3G Connection to Distribute Games." Gizmodo, November 13, 2008. Available at https://web.archive.org/web/20090605040042/http://www.gizmodo.com.au/2008/11/tectoy_zeebo_gaming_system_uses_free_3g_connection_to_distribute_games-2.html.

Diaz, Jesus. "Zeebo Cheap 3D Game Console Launched, Gets Actual Publishers Support." Gizmodo, March 24, 2009.

Hall, Kenji. "Zeebo Takes Wireless Gaming to Emerging Markets." *BusinessWeek*, May 28, 2009.

Zelda Series. *See Legend of Zelda, The* Series

Zen Mode

Although some uses of Zen terminology and imagery can be found in twentieth-century games, such as *Monty Python's the Meaning of Life* (1997), self-titled "Zen Modes" became common during the casual revolution of the first decade of the twenty-first century. Early examples of this are PopCap games such as *Chuzzle* (2005) and *Bejeweled Twist* (2008), which included Zen Modes that removed scores, time limits, and other obstacles to create a "stress-free" experience. Later games, such as *Fruit Ninja* (2010) and *Dexed* (2017), have used the concept in a similar way.

Since their inception, Zen Modes have been regularly associated with reinterpretations of the ideas of immersion and flow. Jenova Chen's *flOw* (2006), a precursor of *Flower* (2009) and so-called Zen gaming, was created as part of a master's thesis on flow. The complete removal of loss conditions is thus a defining trait of these modes. With this, challenge and difficulty, together with their demands and motivations, give way to experiences closer to meditation and relaxation, often in endless play structures.

Zen Modes are usually connected to the Western perception of Zen as a minimalist aesthetic, defined by simplicity and austerity. Zen Modes like those in *Alto's Adventure* (2015) or *Bejeweled 3* (2010) modify their game's presentation, changing the soundtrack to a more serene and calming one or allowing the player to activate ambient sounds, breathing instructions, and binaural beats.

Some games have used this aesthetic as a central element of their design, beyond a specific mode, in a style or genre defined by their creators and marketers as "Zen gaming." This is the case of pioneers such as *Flower*, *Osmos* (2009), and *Zen Bound* (2009). *Tetris Effect* (2018) includes numerous Zen motifs to accompany its focus on trance and synesthetic visuals. *Abzû* (2016), a game heavily influenced by the "Zen game" *Journey* (2012), features "meditation rocks," where the player can use a "meditate" mechanic that results in an achievement called "Zen Master."

Other Zen games and Zen minigames exploit sitting meditation, or Zazen, to make the player sit down as an input, either as an actual Zazen instruction tool or for playful purposes. In the first category we find the Kinect apps *Zazen* (2017) and *Deepak Chopra's Leela* (2011), whereas the second one includes games such as *Wii Fit* (2007), played using the Wii's Balance Board, the "Zen" minigame in *1 2 Switch* (2017), and *Guru Meditation* (2008).

Very often, Zen Modes are reductions, misinterpretations, or, in the worst case, commodifications of Zen ideas, practices, and iconography. They adhere to popular trends in the West that present relaxation and well-being as their ultimate goals and Zen-like elements as goods that help the consumer achieve that well-being. Many Zen Modes, like colorable mandalas and certain mindfulness programs, fit in what some have labeled "McMindfulness" trends and bear no relation to actual Zen play practices such as Go, haiku competitions, or kôans.

Víctor Navarro-Remesal

See also: Contemplative Games

Further Reading

Bogost, Ian. "Persuasive Games: Video Game Zen." Gamasutra, November 29, 2007. Available at http://www.gamasutra.com/view/feature/130994/

persuasive_games_video_game_zen.php.

Byung-Chul, H. *Filosofía del budismo Zen*. Barcelona, Spain: Herder Editorial, 2015.

Chen, J. "Flow in Games (and Everything Else)." *Communications of the ACM* 50, no. 4 (2007): 31–34.

Navarro-Remesal, Victor. "What's Zen about Zen Modes? Prajna Knowledge versus Mindfulness in Game Design." *The Philosophy of Computer Games Conference, Malta, 2016*.

Zircon Channel F. *See* Fairchild/Zircon Channel F

Zynga Inc.

Zynga Inc. is an American video game developer based in San Francisco, California. The company was a pioneer in the genre of social games, and for much of its history, it has remained a market leader in browser-based and mobile games.

The company was founded in 2007 by Mark Pincus, Justin Waldron, Eric Schiermeyer, Michael Luxton, and Steve Schoettler, and it was named after Pincus's American bulldog, Zinga. Under Pincus's management, Zynga utilized Facebook to reach vast numbers of users and reap massive profits. According to estimates, Zynga had an active base of over forty million players by 2009 for titles such as *Zynga Poker* (2007), *Mafia Wars* (2008), and the lucrative *FarmVille* (2009).

Zynga's products popularized the freemium model for games, allowing most users to play for no charge while offering decorative items, power-ups, and shortcuts for cash sales. The model proved successful, and by 2011, Zynga accounted for 19 percent of the revenue moving through Facebook. The company was valued at $10 billion in an IPO (initial public offering) in December of that year.

In 2010, the company moved into a massive 668,000-square-foot facility in San Francisco, offering amenities to employees like daily complimentary gourmet meals, an on-site dog park, a wellness center, and other plush Silicon Valley perks. But Zynga's corporate culture carried a reputation as a harsh meritocracy. Isolated development teams were routinely put into competition with one another for resources and sales goals, management scoured metrics to identify and cull weak links on their teams, and employees complained of long hours and unrealistic deadlines.

zynga
zynga
SOBEL BUILDING

The Zynga sign and bulldog logo on the facade of the social video game services company building. (Michael Vi/Dreamstime.com)

These problems were often credited directly to Pincus himself. Pincus frequently drew controversy, including a speech in which he admitted to unscrupulous business tactics in pursuit of profit and an incident in which Pincus threatened to fire a number of long-term employees if they did not agree to abandon their unvested stock before the IPO.

Pincus also faced questions over his company's design strategies. Zynga faced persistent allegations that their most popular titles were only slightly altered versions of existing games, including such heavyweight titles as *FarmVille*, *Mafia Wars*, *Café World* (2009), and *Dream Heights* (2012). These issues did little to endear Zynga to the rest of the industry or settle questions about whether Zynga's skill-light products qualified as games or profit-hungry scams.

Zynga suffered heavy losses when user trends shifted away from Facebook. Facebook accounted for 86 percent of Zynga's business in 2012. After the failure of its own browser-based platform, and unable to pivot to mobile as quickly as smaller competitors, Zynga lost market share rapidly from 2012 to 2014, resulting in layoffs. Pincus left his role as CEO in 2013, causing stock prices to rise; briefly returned in 2015; and then seemingly stepped down for good in 2016. He remains chairman of the company's board. Although not able to regain their previous heights, Zynga's shift to real-money gambling games and mobile gaming has stabilized the company. More recently, Zynga entered into licensed games, with *Willy Wonka Slots Vegas Casino* (2016) and *Willy Wonka's Sweet Adventure* (2018).

Andrew Kemp-Wilcox

See also: *FarmVille*; Social Media

Further Reading

Zynga website. Accessed October 3, 2020. Available at https://www.zynga.com/.

About the Editor and Contributors

EDITOR

Mark J. P. Wolf is a professor in the Communication Department at Concordia University Wisconsin. He has a BA (1990) in Film Production and an MA (1992) and PhD (1995) in Critical Studies from the School of Cinema/Television (now renamed the School of Cinematic Arts) at the University of Southern California. His books include *Abstracting Reality: Art, Communication, and Cognition in the Digital Age* (2000); *The Medium of the Video Game* (2001); *Virtual Morality: Morals, Ethics, and New Media* (2003); *The Video Game Theory Reader* (2003); *The Video Game Explosion: A History from PONG to PlayStation and Beyond* (2007); *The Video Game Theory Reader 2* (2008); *Myst and Riven: The World of the D'ni* (2011); *Before the Crash: Early Video Game History* (2012); *Encyclopedia of Video Games: The Culture, Technology, and Art of Gaming* (two-volume first edition, 2012); *Building Imaginary Worlds: The Theory and History of Subcreation* (2012); *The Routledge Companion to Video Game Studies* (2014); *LEGO Studies: Examining the Building Blocks of a Transmedial Phenomenon* (2014); *Video Games around the World* (2015); *Video Games and Gaming Cultures* (four volumes, 2016); *Revisiting Imaginary Worlds: A Subcreation Studies Anthology* (2017); *Video Games FAQ* (2017); *The World of Mister Rogers' Neighborhood* (2017); *The Routledge Companion to Imaginary Worlds* (2017); *The Routledge Companion to Media Technology and Obsolescence* (2018); *101 Enigmatic Puzzles: Fractal Mazes, Quantum Chess, Anagram Sudoku, and More* (2020); *World-Builders on World-Building: An Exploration of Subcreation* (2020); *Exploring Imaginary Worlds: Essays on Media, Structure, and Subcreation* (2020); and two novels for which he is looking for a publisher.

He is also founder and coeditor of the Landmark Video Game book series, the founder and editor of the Imaginary Worlds book series, and the founder of the Video Game Studies Scholarly Interest Group and the Transmedia Studies Special Interest Group within the Society of Cinema and Media Studies. He has been invited to speak in North America, South America, Europe, Asia, and Second Life; has had work published in journals, including *Compar(a)ison*, *Convergence*, *Film Quarterly*, *Games and Culture*, *New Review of Film and Television Studies*, *Projections*, and *The Velvet Light Trap*; is on the advisory boards of Videotopia, the

International Arcade Museum Library, and the *International Journal of Gaming and Computer-Mediated Simulations*; and is on several editorial boards, including those of *Games and Culture* and the *Journal of E-Media Studies*. He lives in Wisconsin with his wife, Diane, and his sons, Michael, Christian, and Francis. [mark.wolf@cuw.edu]

CONTRIBUTORS

Espen Aarseth is principal researcher at the Center for Computer Games Research, IT University of Copenhagen. From 1996, Aarseth was an associate professor and, from 2002, a professor at the Department of Humanistic Informatics at the University of Bergen, which he cofounded. He holds a cand. philol. in comparative literature and a Dr. Art. in humanistic informatics, both from the University of Bergen. He has published research on digital power and democracy, science fiction and cyberpunk, digital media, digital literature, humanistic informatics, games and narrative, women and gaming, game ontology, games and cross media, game addiction, and mobile games. He is also cofounder and editor in chief of the journal *Game Studies*, founder of the Digital Arts and Culture conference series, and cofounder of the following conferences: Philosophy of Computer Games, the History of Games, and Games and Literary Theory as well as author of *Cybertext: Perspectives on Ergodic Literature* (1997), a comparative media theory of games and other aesthetic forms. [aarseth@itu.dk]

César Albarrán-Torres is a senior lecturer in media and communication. He has been widely published in academic and nonacademic titles as a film and literary critic, author, and translator. His current research focuses on what he calls *gamble-play media*, hybrid platforms where gambling and digital interactive media intersect. His other research interests include film and television as well as the negotiations between social media and politics in Mexico, particularly concerning the drug cartels. He is the author of *Digital Gambling: Theorizing Gamble-Play Media* (2018). [albarran.cesar@gmail.com]

Frederick Luis Aldama is Distinguished University Professor, Arts & Humanities Distinguished Professor of English, University Distinguished Scholar, and Alumni Distinguished Teacher at the Ohio State University. He is the 2018 recipient of the Rodica C. Botoman Award for Distinguished Teaching and Mentoring and the Susan M. Hartmann Mentoring and Leadership Award. He is the award-winning author, coauthor, and editor of forty books. In 2018, *Latinx Superheroes in Mainstream Comics* (2017) won the International Latino Book Award and the Eisner Award for Best Scholarly Work. He is editor and coeditor of eight academic press book series as well as editor of Latinographix, a trade-press series that publishes Latinx graphic fiction and nonfiction. He is creator of the first documentary on the history of Latinx superheroes in comics (Amazon Prime) and cofounder and director of SÕL-CON: Brown & Black Comix Expo. He is founder and director of the Obama White House award-winning LASER: Latinx Space for Enrichment & Research as well as founder and codirector of the Humanities & Cognitive Sciences High School Summer Institute. He has a joint appointment in

Spanish and Portuguese as well as faculty affiliation in film studies and the Center for Cognitive and Brain Sciences. He is the author of a children's book, *The Adventures of Chupacabra Charlie* (2020). For more on Aldama, visit https://professorlatinx.osu.edu/. [aldama.1@osu.edu]

Jessica Aldred is a doctoral candidate and researcher with the Hypertext and Hypermedia Lab at Carleton University in Ottawa, Canada. Her research focuses on digital character animation and the growing intersections between cinema and video games in the age of media convergence. Her work has been published in *Animation: An Interdisciplinary Journal*; *Games and Culture*; and *Mediascape*. [jessica.aldred@gmail.com]

Lynn Rosalina Gama Alves has a degree in education from the Faculty of Education of Bahia (1985) and a master's (1998) and PhD (2004) in education from the Federal University of Bahia. Her postdoctorate was in the area of electronic games and learning from the Università degli Studi di Torino, Italy. She is currently a professor and researcher at Bahia's Federal University in Salvador, Brazil. She has experience in education, research on gaming, interactivity, and digital culture. She coordinates research and development projects in digital games, such as *Triad* (FINEP/FAPESB/UNEB), *Buzios: Echoes of Freedom* (FAPESB), *Forest Guardians* (CNPq), *Brazil 2014: Towards the Hexa* (SEC-Ba), *Games Studies* (FAPESB), and *Gamebook Forest Guardians* (Capes, CNPq, Fapesb e Uneb), among others. The productions of the research group are available at www.comunidadesvirtuais.pro.br. [lynnalves@gmail.com]

Aubrey Anable is an assistant professor of film studies in the School for Studies in Art and Culture at Carleton University in Ottawa. Her book *Playing with Feelings: Video Games and Affect* (2018) provides an account of how video games compel us to play and why they constitute a contemporary structure of feeling that has emerged alongside the last sixty years of computerized living. [aubrey.anable@car-leton.ca]

Kara Lynn Andersen is an independent screen studies scholar. Her publications include "My Stockings. Lip Them: Consuming Japan through Film and Video Games" (*Post Script Special Issue: Japanese Popular Culture in Films*, Spring/Winter 2009) and "Harry Potter and the Susceptible Child Audience" (*CLCWeb: Comparative Literature and Culture*, volume 7.2, 2005). Her research interests include digital cinema, animation, video games, and digital media. [KLAndersen@brooklyn.cuny.edu]

Thomas H. Apperley, PhD, is an ethnographer that specializes in researching digital media technologies. His previous writings have covered broadband policy, digital games, digital literacies and pedagogies, mobile media, and social inclusion. Tom is currently a senior lecturer at UNSW Australia (the University of New South Wales). He is the editor of the open-access peer-reviewed journal *Digital Culture & Education*, and his open-access print-on-demand book *Gaming Rhythms: Play and Counterplay from the Situated to the Global* was published by the Institute of Network Cultures in 2010. His more recent work has appeared in the journals *Digital Creativity*, *First Monday*, and *Westminster Papers in Culture and*

Communication. [thomas.apperley@gmail.com]

Rhino Ariefiansyah is a junior lecturer and researcher at the Department of Anthropology, Universitas Indonesia. He received his bachelor's degree in cultural anthropology from Universitas Indonesia in 2003 and graduated from the master's program in experimentation in art and politics (SPEAP) from SciencesPo, Paris, in 2014. His research interests are the topics of human ecology, migrations, and climate change. Since 2006, he has been exploring different means of audiovisual media as part of his ethnographic research. He has produced several ethnographic videos, including *Bisa Dewek* (2006), *Wereng di Sawah Petani* (2011), *Alea* (2014), and *Klub Pengukur Curah Hujan Indramayu* (2015), among others. [rhino.ariefiansyah@gmail.com]

Dominic Arsenault is an associate professor at the Department of Art History and Film Studies of the Université de Montréal and a researcher at the LUDOV lab. His teaching and research are focused on the interactive narrative and writing, history, genre, graphics, and music of video games. In 2017, he published the book *Super Power, Spoony Bards, and Silverware: The Super Nintendo Entertainment System*, and in 2020, he released *Power Up the Chips*, the first chipmetal album for his solo musical project Multi-Memory Controller. [dominic.arsenault@gmail.com]

Ben Aslinger is an associate professor and chair in the Department of English and Media Studies at Bentley University, Waltham, Massachusetts. He is the coeditor of *Gaming Globally: Production, Play, and Place* (2013) and *Locating Emerging Media* (2015). [baslinger@bentley.edu]

Barry Atkins is University of Wales Reader in Computer Games Design at the University of Wales, Newport, United Kingdom. He is author of *More Than a Game: The Computer Game as Fictional Form* (2003) and coeditor, with Tanya Krzywinska, of *Videogame, Player, Text* (2007). He has published widely in games and narrative and games and aesthetics. [barry.atkins@newport.ac.uk]

Guillaume Averbuj has been a game designer, project manager, and video game production consultant since 2001 and is currently a scrum master and agility coach in YPF technology and the coordinator of the game design area at Image Campus. He is creator of the Argentine Labor Market of Video Games (IndustriaVG), cofounder and treasurer of the Argentine Video Game Foundation (Fundav), cofounder of the Argentine Video Game Chamber (ADVA), founder and mentor of the GameWorkJam Events Cycle, and creator of the annual networking event for students in Argentina (Networking Jam). [guille.averbuj@gmail.com]

Ralph H. Baer (1922–2014) was an independent engineering consultant and internationally known inventor generally credited with creating the home video game console industry in the 1960s. Baer was an active engineer for over sixty years and accumulated more than 150 U.S. and foreign patents, many of which were in the consumer electronics area and resulted in a variety of products, including many successful electronic toys and games. Typical of these is the SIMON game, an early single-chip microprocessor-controlled game that has been popular for more than thirty years. Baer was the recipient of many professional honors, including the National Medal of Technology, which was presented to him by the president of the United States in 2006; an honorary doctor of laws degree from Pierce Law Center; and many other significant professional awards.

Andrew Baerg is a professor of communication and chair of the Arts & Humanities Division at the University of Houston–Victoria, Texas. His research interests include sports video games, the relationship between sport and media, and social theory. He has published work on games produced by EA Sports and 2K Sports. He also has an interest in quantification and sports in publishing pieces on analytics, big data, fantasy sports, and neoliberalism. [BaergA@uhv.edu]

Jason Scott Begy is a researcher at the Singapore-MIT GAMBIT Game Lab. His research interests include modes of representation and meaning-making in games —including metaphor, simulation, and semiotics—and the so-called casual games sector. He also teaches game design and manages student game development projects. [jsbegy@MIT.edu]

Matt Benic has worked in game development and related industries for over fifteen years in technical and leadership roles. He has worked on published titles for multiple console and mobile platforms as well as simulation and other applications that make use of game technology. He is currently working on virtual reality training applications for Business Science Corporation in Johannesburg. He has been involved in the budding South African game development community from the start of his career, with an interest in growing the available skills in the country to help the industry level up. [mattbenic@gamil.com]

Tamás Beregi acquired his first computers (a ZX Spectrum and later a Commodore 64) sometime around 1983. He spent the next fifteen years in front of various TVs and monitors playing a wide range of video games and became an adventure game fanatic after playing the first text adventures released by the British company Magnetic Scrolls in the mid-1980s. Realizing that his childhood had suddenly passed, he quickly started to research game history. His richly illustrated, 450-page book *Pixel Heroes: The First Fifty Years of Computer Games* was published in 2010. It is the first book in Hungarian on the history of video games. Since the early 1990s, Tamás has regularly contributed to leading Hungarian computer and film magazines, where his main interest is the representation of the fantastic and the relationship between video games and movies. In 1999, he founded the first online computer game museum in Hungary.

Tamás first studied biology and geography at university, but his interests later shifted to art history and film studies. He received his PhD in art history from Manchester University in 2008. He is the author of three fantasy novels and wrote a national best seller in Hungary entitled My One and Onlies that was later made into a feature film. The book combines Tamás's interest in partying and the underground scene of Budapest with scientific observations on how to find the ideal woman. (The book has a one hundred-page-long appendix that guides the reader through this task with the use of mathematical and geometrical formulas.) Tamás has written scripts for a number of movies, including a romantic comedy, a historical drama, and a Hungarian Icelandic CGI animation movie. He also wrote a successful alternate reality game in 2008. He is currently working for the Hungarian Film Board as a script reader and developer, and he is also adding the finishing touches to his fifth novel. He lives with his cat and dog (both female) in the hills of Buda, where he often goes to collect his favorite mushrooms. [tamas.beregi@gmail.com]

Ophélie Bernard is a master's student, lecturer, and contributor to the research projects at the Montréal center of the UQAT (Université du Québec en Abitibi-Témiscamingue), under the direction of Simon Dor. Her research interests stretch from games to media studies, sociology, and spectatorship in games and queer issues in game studies. The current focus of her studies is on the impact of the games themselves and their gameplay in the spectator experience of video games. [Ophelie.Bernard@uqat.edu]

Courtney Blamey is a PhD student at Concordia University in the Department of Communication Studies. Her doctoral research concentrates on redefining and contextualizing the concept of player agency. Her previous research unpacked Blizzard's approach to community moderation in *Overwatch* (2016) by investigating both developer and community inputs on forums. She is a member of the mLab, a space dedicated to developing innovative methods for studying games and game players. [courtney.blamey@hotmail.com]

Alexis Blanchet is an associate professor in film studies at the Université Paris III Sorbonne Nouvelle, France. Formerly associated with the French National Library and a member of the Observatoire des Mondes Numériques en Sciences Humaines (Omnsh), he is currently studying the cultural, economic, and technical synergies between cinema and the video game and is interested in how the public nowadays is being offered extended and transmediatic fictional worlds. [alexis.blanchet@gmail.com]

Wolfgang Boehm is currently a PhD student in the Cinema and Media Studies department at the University of Chicago. His research focuses on the history and theory of North American animation and the Frankfurt School. He earned his MA in moving image studies from the School of Film, Media & Theatre at Georgia State University. [wboehm1@student.gsu.edu]

Ian Bogost is Ivan Allen College Distinguished Chair in Media Studies and professor of interactive computing at the Georgia Institute of Technology, where he also holds appointments in the School of Architecture and the Scheller College of Business. Bogost is also a founding partner at Persuasive Games LLC, an independent game studio, and a contributing editor at *The Atlantic*. He is author or coauthor of many books, including *Unit Operations: An Approach to Videogame Criticism* (2006), *Persuasive Games: The Expressive Power of Videogames* (2007), *Racing the Beam: The Atari Video Computer System* (2009), *Newsgames: Journalism at Play* (2010), *How to Do Things with Videogames* (2011), and *Play Anything: The Pleasure of Limits, the Uses of Boredom, and the Secret of Games* (2016). Bogost's video games cover topics as varied as airport security, disaffected workers, the petroleum industry, suburban errands, and tort reform. His award-winning games have been played by millions of people, exhibited internationally, and held in institutional collections, including the Smithsonian American Art Museum. [ian.bogost@lcc.gatech.edu]

Nis Bojin is a doctoral candidate at Simon Fraser University's School of Interactive Arts. A designer and writer for *Zeros 2 Heroes Media,* Nis is also the program manager for the National Screen Institute's game writers training program, NSI playWRITE. With interests in conceptual game design and epistemologies of play, Nis continues to work on various game and transmedia projects that range from serious games to interactive social networks and alternate reality games. [nisbojin@yhoo.com]

Maude Bonenfant is an associate professor at the Departement of Social and Public Communication, Université du Québec à Montréal (UQAM). She holds a PhD in semiotics and specializes in online social networks and communities, big data and AI, gamification, and video games. She holds a Canada Research Chair on Big Data and Gamer Communities, and she is also codirector of the Research Laboratory for Social Media and Gamification, director of the Homo Ludens research group on gaming practices and communication, and an active member of the research group GRISQ, focusing on information and surveillance in everyday life. [maudebonenfant@hotmail.com]

Jonathan Bonneau teaches in the Communication Department for the University of Quebec in Montreal. He is completing a doctoral thesis on the effect of conflicts in context of role-playing games on the immersion experienced by players. An active member of the research group Homo Ludens and coordinator for the Social Media and Gamification Lab, he orchestrates and supervises multiple research-creation projects exploring artificial and human-machine communication through game design and biometrics. [jobonneau@rocketmail.com]

Aaron D. Boothroyd is a lecturer of new media at the University of Maine. He holds a BA in new media and an MA in interdisciplinary studies. He currently serves as the president of Levelbest LLC, a multimedia studio that specializes in filmmaking and game design. [aaron.boothroyd@maine.edu]

Andrew Borman is the digital games curator at the Strong National Museum of Play in Rochester, New York. He is interested in the game development process with a focus on unreleased and prototype versions of games. His work at the Strong focuses on the preservation of games, including both the preservation of physical games in the museum's collection along with born-digital titles such as those on modern consoles and mobile devices. [aborman@museumofplay.org]

Kelly Boudreau, PhD, is an assistant professor of interactive media theory and design at Harrisburg University of Science and Technology. With a background in sociology, film studies, and games studies, her work focuses on digital games, players, and player communities. Her current research ranges from exploring different forms of sociality in gameplay and player/avatar hybridity developed through the networked process of play to addressing different issues around toxic and problematic behavior in digital gameplay. [kelly.boudreau@gmail.com]

Etienne Brunelle-Leclerc is a PhD student in game studies at Université du Québec en Abitibi-Témiscamingue in Montreal, Canada. His research interests include video game history, strategy game design, and esports. His current work focuses on the latter and seeks to better understand how esports went from a marginal gaming phenomenon to a worldwide cultural industry by untangling the complex and often bilateral relationships between the design and the reception of competitive video games. [etienne.brunelleleclerc@gmail.com]

P. Konrad Budziszewski was a PhD candidate in the Department of Communication and Culture at Indiana University, Bloomington. His research focused on the technologies of electronic gaming, as reflected in and constituted by the practices, discourses, and affects that surround them.

Nolan Bushnell is an entrepreneur, businessman, and innovator. His career spans over 40 years, during which he has made innovations and contributions to several industries. He is best known as the father of the arcade video game industry (which started with *Computer Space* [1971]) and the founder of Atari, the Chuck E. Cheese entertainment restaurant chain, Axlon (makers of interactive toys), Catalyst (the first high-tech incubator), Etak (the first automobile navigation system), ByVideo (the first online shopping system), and more. Through the years, Bushnell has given more than 2,000 speeches on subjects ranging from his companies, the history of video games, the process of innovation, entrepreneurship, intrepreneurship (bringing to market a new project in an old company), and his ten steps to bringing projects to market with no money. His speeches, although being somewhat irreverent to established clichés, are humorous, high energy, and always thought provoking. Bushnell has been inducted into the *Consumer Electronics*' Hall of Fame, the Video Game Hall of Fame, and the Computer Museum's Hall of Fame; he has been named as one of *Newsweek*'s "50 Men That Changed America"; *Restaurant Business's* "Innovator of the Year"; Distinguished Fellow, University of Utah; and Distinguished Leader of Silicon Valley. His numerous awards include the Amusement Operators of America's Lifetime Achievement Award; the Agenda "Crystal Ball Award"; the Babson College "Distinguished Entrepreneur" Award; and the British Academy of Film and Television Arts (BAFTA) Lifetime Achievement Award.

Mark Butler, Dr. des., is a cultural scientist, media theoretician, and futurologist. He studied Kulturwissenschaft and European ethnology at the Humboldt University, Berlin, where he also turned in his dissertation entitled *Das Spiel mit sich: Populäre Techniken des Selbst zu Beginn des 21. Jahrhunderts* (*Playing with Oneself: Popular Techniques of the Self at the Beginning of the 21st Century*). Currently, he is a research fellow in the Department for European Media Studies at the University of Potsdam. He has published a monograph and various articles on the psychodynamics, performative aesthetics, and embodied experience of computer game playing. He is also a founding member and editor of the journal *ilinx. Berliner Beiträge zur Kulturwissenschaft* (*ilinx. Berlin Contributions to Cultural Science*). [mark.emerson.butler@googlemail.com]

Kursat Cagiltay is a professor of the Department of Computer Education and Instructional Technology at the Middle East Technical University (METU), Ankara, Turkey. He earned his BS in mathematics and MS in computer engineering from Middle East Technical University. He holds a double PhD in cognitive science and instructional systems technology from Indiana University Bloomington. He is the director of METU's Audio Visual Systems Research and Development Center and coordinator of the Instructional Technology Support Office. Dr. Cagiltay is the founder of three research groups at METU: Simulations and Games in Education (SIMGE—simge.metu.edu.tr), the HCI research group (hci.metu.edu.tr), and Educational Neuroscience/Neurotechnology (http://ed-neuro.ceit.metu.edu.tr/en/). He established Turkey's first HCI research lab with eye-tracking facility at METU. His research focuses on social and cognitive issues of electronic games, human-computer interaction, instructional technology, sociocultural aspects of technology, technology-enhanced learning, human performance technology, and educational neuroscience/neurotechnology. [kursat@metu.edu.tr]

Brett Camper designs, studies, and writes about computational media, with a particular interest in media history, games, user interfaces, mapping, and computer graphics technologies. His work as an independent software developer includes 8-Bit NYC, a web map that reenvisions New York in the style of a 1980s video game, and Trees Near You, an iPhone application that maps and tracks more than a half million trees in New York City. He has previously served as the research manager of the Massachusetts Institute of Technology's (MIT's) Education Arcade and is currently the director of product management at Kickstarter, a crowdfunding platform for creative endeavors. He holds an MS in comparative media studies from MIT, where he studied the homebrew community surrounding Nintendo's Game Boy Advance handheld platform. [brettcamper@gmail.com]

Marco Benoît Carbone has a PhD in intercultural studies from the University College London (UCL) and is a lecturer at Brunel University, London, where he teaches modules in the History of Media and Digital Games, Social Research Methods, and Critical Approaches to Design. He is a founding member and the managing editor of *GAME Journal* (www.gamejournal.it) and a member of the editorial board of *JICMS* (*Journal of Italian Cinema and Media Studies*) from Intellect Publishing. He is a board member of the Italian and British branches of DiGRA (Digital Games Research Association). His research on games focuses on industries and players in historical and sociocultural perspective and, more broadly, on ethnographic methods and the mediated representations of gender, ethnicity, and nationality. [marcobenoitcarbone@gamil.com]

Marcus Carter is a researcher in digital cultures and human-computer interaction. Building on his undergraduate background in the history and philosophy of science and technology, he completed a PhD in the Interaction Design Lab at the University of Melbourne in 2015, studying the design and player experience of the game *EVE Online* (2003). Dr. Carter has published extensively in game studies on a range of titles, such as *Warhammer 40,000* (1987), *EVE Online*, *Candy Crush Saga* (2012), *DayZ* (2013), and the reality TV series *Survivor* (2000–Present). He is formerly the president of the Digital Games Research Association of Australia and was named one of MCV Pacific's "30 under

30" in the Australian and New Zealand games industry in 2017. Following the completion of his PhD, Dr. Carter was appointed as a research fellow in the Microsoft Research Centre for Social Natural User Interfaces, at the University of Melbourne. In this role, he worked on developing and studying new technologies and interfaces using gaze tracking, conversational interfaces, and touchless gestural interaction, with a focus on their social use and impact. It was in this role that Dr. Carter led the development of the Kinecting with Orangutans project, developing novel digital enrichment for the Orangutans at Melbourne Zoo utilizing the Microsoft Kinect. This has led to his current research interest in how digital technologies can support the animal welfare and conservation education goals of zoos. Dr. Carter joined the University of Sydney in January 2017. He is currently the degree director for the Master of Digital Communication and Culture and a codirector of the Socio-Tech Futures Lab, exploring the Faculty of Arts and Social Sciences flagship research themes attempting to address the social, ethical, and inclusive challenges with emerging technologies, such as artificial intelligence, robotics, virtual reality, and augmented reality. In 2019, Dr. Carter was included in *The Australian*'s *Research* magazine's list of "Australia's Top 40 Researchers Who Are Less Than 10 Years into Their Careers" and among the top five scholars in Humanities, Arts, and Literature. [marcus.carter@sydney.edu.au]

Sandra Castro Pinzón is a Colombian journalist with a master's in political communication, who uses her knowledge in advocacy to empower the video game industry. She is the founder of Tan Grande y Jugando (TGYJ; which translates to "Grown and Playing"), where she works as a journalist, vlogger, gamer, and researcher. TGYJ is the official organizer of the Women Game Jam Colombia. Castro is currently the video game chapter director of FEDESOFT, the federation of her country. [scastropinzon@gamil.com]

Francisco E. Cattaneo Esnaola is a graduate of interactive game design at Palermo University, Argentina. He worked on *Blind Ninja* (2019) and *Element Space* (2019) at Sixth Vowel and is currently working on *Quantum League* (2019) at Nimble Giant Entertainment. During November 2018, he assisted the students of game development and transmedia storytelling at Vigo University, Spain, giving his point of view on the game industry and game development. [franfece@gmail.com]

Daniel Cermak-Sassenrath is an associate professor at the ITU, Copenhagen, and member of the Center for Computer Games Research (game.itu.dk) and the Pervasive Interaction Technology Lab (PitLab, pitlab.itu.dk). Daniel is interested in artistic, analytic, explorative, critical, and subversive approaches to and practices of play. More info is available at dace.de. [mail@dace.de]

Humberto Cervera is an entertainment industry professional with eight years of experience in the industry. His video game credits include *Construye tu Mexico* (2012), *El camino para vivir mejor* (2012), *Club VLP* (2012), *Banamex: My Life* (2013), *Robo Jungle Rush* (2013), *Kuijez* (2017), *Mansion Alien* (2019), and *Agent Awesome* (2015), his first original game. In 2015, Humberto started the Original Productions department for Cartoon Network Latin America, in Mexico, where he stayed until 2019. There, he led the development and productions of hit series such as *Villainous* (2017), *Toontorial* (2018), *Viking Tales* (2018), *Frankelda Book of Spooks* (2019), and *The Forgotten Forest* (2019), among other still unannounced projects. He had the honor of also participating on the writing team of *Frankelda Book of Spooks* and *The Forgotten Forest*. Cervera never misses a chance to speak highly of video games and animation, and he is convinced that entertainment can save the world. He has done public speaking at TEDxDF, DevHour, and various universities, such as the ITESM, UIA, and UVM. He currently teaches scriptwriting at ESCENA and Game Design at Platzi. Humberto also has five years of experience as part of the Mexican game press, writing for *Red Bull Mexico*, *IGN Latin America*, and *GoGo Catrina*. Currently, Humberto is once again working as an independent creator in a variety of projects. His experience as a journalist, an independent creator, and as an executive give him a unique vision for the Latin American entertainment industry. Feel free to hit him up if you want to learn more about the local scene. [Humberto_cervera@hotmail.com]

Peichi Chung, PhD, is an associate professor in the Department of Cultural and Religious Studies, Chinese University of Hong Kong. She teaches courses related to digital culture, global communication, and Asian popular culture. Her research interests are Asian cinema and global game industry studies. Her ongoing publications focus on comparative research of game industry dynamics in East and Southeast Asia. Her present research project examines independent game distribution in China and player welfare in the esports industry in East Asia. [peichichung_1999@yahoo.com]

Karen Collins is Canada Research Chair in Interactive Audio at the University of Waterloo, where she teaches game design and sound for interactive media. She is the author of *Game Sound* (2008) and the editor of a collected volume about interactive audio, *From Pac-Man to Pop Music* (2008). [collinsk@artsservices.uwaterloo.ca]

Mia Consalvo is a professor and Canada Research Chair in Game Studies and Design at Concordia University in Montreal. She is the coauthor of *Real Games: What's Legitimate and What's Not in Contemporary Videogames* (2019) and *Players and Their Pets: Gaming Communities from Beta to Sunset* (2015). She is also coeditor of *Sports Videogames* (2013) and the *Handbook of Internet Studies* (2011) and is the author of *Cheating: Gaining Advantage in Videogames* (2007) as well as *Atari to Zelda: Japan's Videogames in Global Context* (2016). Mia runs the mLab, a space dedicated to developing innovative methods for studying games and game players. She is a member of the Centre for Technoculture, Art & Games (TAG), and she has presented her work at industry as well as academic conferences, including regular presentations at the Game Developers Conference. She is the past president of the Digital Games Research Association and has held positions at MIT, Ohio University, Chubu University in Japan, and the University of Wisconsin–Milwaukee. [mia.consalvo@concordia.ca]

Patrick Crogan is an associate professor of digital cultures at the University of the West of England. He has published numerous texts on video games in anthologies and journals. He is the author of *Gameplay Mode: War, Simulation and Technoculture* (2011). [Patrick.Crogan@uwe.ac.uk]

Paul Dalg was born in 1986 and studied general history and German philology in Potsdam, Germany. He finished his studies with the BA thesis "Videogames as Threat—Public Discourse and Practices of Youth Protection in the Media in the Federal Republic of Germany (1980–1994)." Between 2011 and 2018, he worked at the German age rating board (USK) as a game tester, online youth protection adviser, and consultant for international video game publishers, and he held talks at GDC Europe and the Quo Vadis Game Developer Conference about youth protection regulation and censorship. Since the end of 2018, Paul has been working as a journalist for games, tech, and digitization at the German newspaper *Der Tagesspiegel* in Berlin. [paul@paulpunkt.de]

Erwan Davisseau is a former video game artist, lead artist, and art production manager who worked thirteen years in the game industry on international renowned franchises such as *Splinter Cell*, *Prince of Persia*, and *Far Cry*. He is a PhD candidate at UQAM (University of Québec in Montréal) and a professor at UQAT (University of Québec in Abitibi-Témiscamingue) in Montréal. His field of research is about video game semiotics and how 3D environments inform the player how to play without the need of overlaid information, such as a heads-up display (HUD). Opposed to the classic way of having two different universes of signs (symbolic versus iconic) to communicate with the player, he argues that a specific genre is developing an effective iconic visual language called ludonarrative resonance by sharing the same universe of signs as the environment (despite its strong complexification and densification over the last decade) to clearly suggest actions to perform. [Erwan.Davisseau@uqat.edu]

Suzanne de Castell is a professor of curriculum and instruction in the Faculty of Education at Simon Fraser University. Her work spans literacy, technology, gender, educational game theory, research, design and development, and multimodal analysis of communicative interaction. Her recent work includes *Worlds in Play: International Perspectives on Digital Games Research* (2008; coedited with Jennifer Jenson), *Loading . . . The Journal of the Canadian Game Studies Association*, work on design and development of educational games (*Contagion* and *A Baroque Adventure*), and recent publications on digital games and education, gender, and gameplay and multimodal learning in informal and community settings. [decaste@sfu.ca]

Mario De Govia has enjoyed video games since the age of six, when his father brought home an Atari 2600. Mario became inextricably linked to the gaming industry when Nintendo co-opted his name and opened the floodgates of playground teasing. After graduating from the University of California, Berkeley, he joined Prima Publishing in 1998 and turned his youthful pain into a career. As an editor, writer, and project manager at Prima, the premier publisher of video game strategy guides, Mario has been involved with some of the biggest titles of the era, from writing the original *Halo: Combat Evolved* (2001) game guide to managing the guides for *Fallout 3* (2008) and *Fallout: New Vegas* (2010). He currently works for KlickNation as a senior director overseeing the Facebook games *Superhero City* (2009) and *Age of Champions* (2010). He does not have a brother named Luigi. [planet4@gmail.com]

Patrick Deslauriers is a PhD student in communication and teaching fellow at the University of Quebec in Montreal (UQAM). The recipient of a Social Sciences and Humanities Research Council (SSHRC) grant, he is a member of the Homo Ludens research group as well as the Interuniversity Center for Research on Communication, Information, and Society (Centre de recherche interuniversitaire sur la communication, l'information et la société, CRICIS). He has also worked as a research associate for several video game companies (Behaviour Interactive, Ubisoft, and Vandal Games). His thesis focuses on collective passion and protest dynamics within video game communities. His research interests include communication dynamics and issues within the video game industry and gaming communities. [deslauriers.patrick@uqam.ca]

Jennifer deWinter is a professor of rhetoric and director of the Interactive Media and Game Development program at Worcester Polytechnic Institute. She teaches courses on game studies, game design, and game production and management. Additionally, she teaches in the Professional Writing program. She has published on the convergence of anime, manga, and computer games both in their Japanese contexts and in global markets. Her work has appeared in numerous journals, including *Works and Days*, the *Journal of Gaming and Virtual Worlds*, *Eludamos*, *Computers and Composition*, and *Rhetoric Review*. Additionally, she is the coeditor of the Influential Game Designers book series, for which she wrote a book on Shigeru Miyamoto. [jdewinter@wpi.edu]

Laurie-Mei Ross Dionne is completing a master's degree in anthropology at Université de Montréal, Canada. Her research focuses on Japanese culture and video games and, more specifically, how the genre that has been known as "visual novel" in the West is culturally defined by developers and gamers alike in Japan. She is also an animator, layout artist, and illustrator specialized in 2D animation. [lrossdionne@gmail.com]

Joseph C. DiPietro serves as the Training and Education program manager at the United States Sentencing Commission in Washington, DC. He and his team oversee a variety of education-related courses, deliverables, and professional development resources that help disseminate sentencing-related content for interested parties (typically judges, probation officers, and defense attorneys). Joe is a former public school teacher, instructional designer, and university professor with a passion for all things educational technology related. He has over sixteen years of experience in managing the planning, delivery, support, and evaluation of online, blended, and face-to-face learning experiences in federal, private sector, postsecondary, and public education environments. Dr. DiPietro is an expert in assessing and promoting the quality of online and blended/hybrid offerings; in maximizing comprehensibility of technology-mediated course structures; and in ensuring alignment between learning objectives and various federal/national accreditation standards. He has vast experience using research- and learner-based needs analyses to engage with and lead collocated or virtual design teams to meet deadline-driven specific learning outcomes. Joe began facilitating online professional development in 2004 and taught his first online course in 2006. He has made mastering his craft the focus of his work, and his areas of interest focus most keenly on the fields of online teaching and learning, best practices of technology-mediated instruction, efficacy of professional development, efficiency in project management, and instructional design innovations. [edug8r@gmail.com]

Tristan Donovan is a British writer and gaming historian. His books include *Replay: The History of Video Games* (2010) and *It's All a Game: The History of Board Games* (2017). He has written about games for *Edge*, Eurogamer, *The Times*, *The Guardian*, Stuff, Gamasutra, and BBC News among others. He also writes scripts for the award-winning podcast series *Business Wars*. [tristan.donovan@gmail.com]

Simon Dor is an assistant professor at Université du Québec en Abitibi-Témiscamingue (UQAT). His research mainly focuses on strategy games, whether it is from a gameplay or representational point of view, with a competitive or narrative lens, or using a cognitive, philosophical, or historical approach. His teaching and research also led him to work on esports, immersion, ethics, emulators, and game design. He also writes on a personal research blog (http://www.simondor.com) and often uses Twitch and YouTube to understand their impact on gaming culture and to share his work. [simon.dor@uqat.ca]

Judith Dormans researched narrative fan practices based on pervasive game worlds at Maastricht University, the Netherlands. She graduated from the Digital Games: Theory & Design Master's Program at Brunel University, London. Her research interests focus on communities, narrative, and design in video games. [judithpasmans@gmail.com]

David O. Dowling, PhD, is an associate professor in the School of Journalism and Mass Communication at the University of Iowa. The author of eight books, his most recent is *Immersive Longform Storytelling: Media, Technology, Audience* (2019). His current book project is *Gaming and Journalism: Nonfiction Narrative's Newest Medium*. His research on publishing industries and digital media has appeared in *Convergence*, *Games and Culture*, *Digital Journalism*, *Journalism & Communication Monographs*, and *Genre*, among other journals. He teaches digital and gaming culture, media history and culture, and principles of journalism. [david-dowling@uiowa.edu]

Jon-Paul C. Dyson, PhD, works for the Strong in Rochester, New York, where he is director of the International Center for the History of Electronic Games (ICHEG), vice president for exhibit research and development at the National Museum of Play, and book review editor of the *American Journal of Play*. ICHEG is home to the most comprehensive public collection of video games and video game–related historical materials in the United States, which are used for scholarly research and the creation of exhibits such as *eGameRevolution*, on display at the National Museum of Play. [jpdyson@thestrong.org]

Trevor Elkington is a popular culture and media scholar. He currently works in cloud software consulting, having previously worked as a producer at Warner Brothers' Surreal Software studio and SCEA's RedZone studio. Before working in video game development, Trevor was an assistant professor of popular culture at the University of Copenhagen and has taught literature and media studies at the

University of Washington. He is the author of numerous essays on video games, film, and literature. He is coeditor of *Transnational Cinema in a Global North: Nordic Cinema in Transition* (2005), an essay collection that positions the film industries of the five Nordic countries in a globalized context. He received his PhD in comparative literature and critical theory from the University of Washington in 2001. [trevorelkington@hotmail.com]

Barrie Ellis has been building accessible game controllers and pushing for better game accessibility since 1995. He formed the website OneSwitch.org.uk in 2002 to promote one-switch access to leisure and also accessible gaming solutions in general. Since 2007, he has worked with the UK gaming charity SpecialEffect.org.uk, and is currently employed part-time as a technical specialist. He has a particular interest in reduced-control solutions and also the history of game accessibility. From this, a fascinating collection of accessible gaming ephemera has resulted, which he sometimes exhibits and gives talks upon. A related book, *One Switch 100*, is in the works. [barrie.ellis@oneswitch.org.uk]

Graciela Alicia Esnaola has a PhD in pedagogy and an MA in educational research and teaching quality from the University of Valencia, Spain. She graduated as a specialist in e-learning from the University of Venetto, Italy. She has been a research manager in educative technology and video games and is currently exploring the One Laptop per Child pedagogical model. She has been invited by international universities as an expert in research on video games and learning, and is a professor in the doctoral program at the University of Salamanca and in e-learning courses at the University of Valencia. She coordinates high studies in psychopedagogy and is the author of the book *The Construction of Knowledge in Today's Culture: What Do Videogames Tell Us?* and many scientific publications. Her website is https://sites.google.com/site/dragracielasnaola/. [graesnaola@gmail.com]

Anna Everett is a professor of film, television, and new media studies and former chair of the Department of Film and Media Studies at the University of California, Santa Barbara (UCSB). From 2002 to 2005, she was director of the UCSB Center for Black Studies. She has published numerous books and articles, including *Returning the Gaze: A Genealogy of Black Film Criticism, 1909–1949* (2001); *The Revolution Will Be Digitized: Afrocentricity and the Digital Public Sphere* (2001), *New Media: Theories and Practices of Digitextuality* (2003; with John T. Caldwell), *AfroGEEKS: Beyond the Digital Divide* (2006; with Amber T. Wallace), and *Learning Race and Ethnicity: Youth and Digital Media* (2007) for the MacArthur Foundation's new series on Digital Media, Youth, and Learning. Her monograph *Digital Diaspora: A Race for Cyberspace* won a 2009 Choice Award for Outstanding Academic Book. Among her articles are "The Other Pleasures: The Narrative Function of Race in the Cinema," "The Black Press in the Age of Digital Reproduction: Two Exemplars," "P.C. Youth Violence: 'What's the Internet or Video Gaming Got to Do with It?,'" "Trading Private and Public Spaces @ HGTV and TLS: On New Genre Formations in Transformation TV," and "Serious Play: Playing with Race in Computer Games." Dr. Everett is founding editor of the journal *Screening Noir: A Journal of Film, Video and New Media Culture*. [everett@filmandmedia.ucsb.edu]

Gerald Farca is a professor in game studies and narrative design at the Macromedia University of Applied Sciences in Leipzig. He obtained his PhD in the English Literature department at Augsburg University in 2017, where he is now a member of the Cultural Ecology Research Group (Environmental Humanities). Gerald has published research on game studies, narrative in games, ecocriticism, utopia, dystopia, and science fiction, and he is the author of *Playing Dystopia: Nightmarish Worlds in Video Games and the Player's Aesthetic Response* (2018). In addition, he was a visiting lecturer and researcher at the Center for Computer Games Research at the IT University of Copenhagen in 2016 and the CESAG of the Universidad Pontificia Comillas in Palma in 2018. His research now focuses on ecological science fiction in digital games and the regenerative aspects of play. [gerald.farca@gmail.com]

Febrian was born in Jakarta, February 18, 1986, and has a master's degree in communication science. He graduated in 2014 from Universitas Indonesia. He works for the Department of Tourism, Vocational Education Program, Universitas Indonesia. [pepitopepep@gmail.com]

Alexander Fedorov is president of the Russian Association for Film & Media Education since 2003 and vice rector of the Anton Chekhov Taganrog State Pedagogical Institute (Russia) since 2005. He is a member of the Russian Academy of Film Arts & Sciences (since 2002), the Russian Union of Filmmakers (since 1984), CIFEJ (International Center of Films for Children and Young People, Canada), and FIPRESCI. He holds a master's degree from the Russian Institute of Cinematography (VGIK, 1983) and PhD (1986) and EdD (1993) degrees with an emphasis in media education from the Russian Academy of Education (Moscow).

His postdoctoral affiliations include visiting senior research scholar (1998 and 2006) at Central European University, Budapest, Hungary; visiting senior research scholar (2000) at Kassel University, Germany, and at Humboldt University (Berlin, 2005); visiting senior research scholar, 2002 and 2009, at Maison des Sciences de l'Homme (MSH, Paris, France); and research scholar, 2003, at the Kennan Institute (The Woodrow Wilson Center, Washington, DC.). He received the scientific grants/fellowships from various institutions, including the Russian Education Ministry (1997–2012); the Russian President Program for Leading Scientific Schools (2003–2005); the MacArthur Foundation (USA), for travel to the UNESCO International Media & Media Education Conference (Paris, France, 1997) and for an individual research project (2003–2004); the Russian Foundation for Humanities (1999–2012); the Cultural Foundation of the President of Russian Federation (2002); the program Russian Universities in the humanities area (2002); the Soros Foundation (USA); Research Support Scheme (RSS, 2000–2002); the program Civil Society (1998–99); HESP (HESP-CDC—Course Development Competition, 1998); the education program for the best text of university lectures (1997); and the Switzerland Scientific Foundation (2000).

He has been the speaker at many international media and media education/literacy conferences, including the UN "Alliance of Civilizations" (Madrid, 2008); UNESCO Media Literacy Conference (Paris, 2007); Council of Europe Media Literacy Conference (Graz, 2007); Association for Media and Technology in Education, Concordia University (Montreal, Canada, 2003); World Congress "Toys, Games and Media," University of London, Institute of Education (London, 2002); the Council of Europe's Hearing on Internet Literacy (Strasbourg, France, March 2002); the 3rd World Summit on Media for Children (Thessaloniki, Greece, 2001); International Council for Educational Media ICEM-CIME—Conference "Pedagogy and Media" (Geneva, Switzerland, 2000); World Summit 2000: Children, Youth and the Media—Beyond the Millennium (Toronto, Canada, 2000); AGORA European Children's Television Center (Thessaloniki, Greece, 1999); Educating for the Media and the Digital Age (Vienna, Austria, UNESCO, 1999); World Media Education/Literacy Summit (Sao-Paulo, Brazil, 1998); Media & Science (Montreal, Canada, 1997); and Youth and the Media, Tomorrow (Paris, France. UNESCO, 1997).

He is the author of four hundred articles and twenty books about media, film, and media education/literacy. On September 24, 2019, Fedorov was awarded the Global Media and Information Literacy Award 2019. This award is presented annually, with the participation of UNESCO, for outstanding achievements and leadership in the field of information and media and media culture, to researchers, educators, artists, activists, associations, and other groups that innovatively integrate media and information literacy into their work and related activities. [1954alex@mail.ru]

Richard E. Ferdig is the Summit Professor of learning technologies and professor of educational technology at Kent State University. He works within the Research Center for Educational Technology and the School of Teaching, Learning, and Curriculum Studies. He earned his PhD in educational psychology from Michigan State University. He has served as researcher and instructor at Michigan State University, the University of Florida, the Wyzsza Szkola Pedagogiczna (Krakow, Poland), and the Università degli studi di Modena e Reggio Emilia (Italy). At Kent State University, his research, teaching, and service focus on combining cutting-edge technologies with current pedagogic theory to create innovative learning environments. His research interests include online education, educational games and simulations, the role of faith in technology, and what he labels a deeper psychology of technology. In addition to publishing and presenting nationally and internationally, Ferdig has also been funded to study the impact of emerging technologies, such as K–12 virtual schools. Rick was the founding editor in chief of the *International Journal of Gaming and Computer Mediated Simulations*, and he is the current editor in chief of the *Journal of Technology and Teacher Education*. He also serves as a consulting editor for the development editorial board of *Educational Technology Research and Development*. [rferdig@gmail.com]

Simon Ferrari is the director of Games and Entertainment Applications at AMC Networks, and he serves on the advisory board for the NYU Game Center Incubator. He is the coauthor of *Newsgames: Journalism at Play* (2010). [chungkingexpress@gmail.com]

Jean-Pierre Flayeux, PhD, is a professor at University of Québec in Abitibi-Témiscamingue, Digital Creation, and New Media (Montreal Center) and is in charge of the Visual Effects program. His research interests include visual effects in films and video games, compositing, rendering and real-time rendering, and artificial intelligence linked to images in movement via Deep Dream (deepflow, deepmatching, style transfer, etc.). He is a member of the Visual Effects Society.

He used to work in the game and visual effects industries (Ubisoft, Behavior, Digital Dimension, and Hybride Technologies, among others) for about twenty years before switching to the university. There is more information on his work in film on IMDB :http://www.imdb.com/name/nm2458331. [Jean-Pierre.Flayeux@uqat.ca]

Alberto Flores del Río is a screenwriter and a freelance critic who resides in Lloret de Mar (Catalonia, Spain). His works about literature, cinema, music, video games, and new media have appeared in Spanish publications such as *El Mundo*, *Go*, *Quimera*, and *HipHopFlash*. He is currently developing Ludognosis, a multimedia project about video games, semiotics, and audiovisual arts. [floresgohome@gmail.com]

Eelke Folmer is a professor in the Department of Computer Science and Engineering, University of Nevada, Reno. He received his PhD in software engineering from the University of Groningen, the Netherlands. His research interests lie in the area of human-computer interaction, specifically researching interfaces for immersive 3D applications, such as video games and virtual worlds. His current research interests involve virtual locomotion and VR sickness. [efolmer@unr.edu]

Gonzalo Frasca, PhD, is cofounder of Powerful Robot Games, one of the leading game development studios in South America. He is also chair of videogames at the ORT University in Montevideo, Uruguay. As a researcher, his work focuses on game rhetoric, game design, and serious games. Frasca received a Lifetime Achievement Award from the Knight Foundation for his Newsgaming.com project. He also codeveloped the first official video game for a U.S. presidential campaign. [frasca@DragonBox.com]

Gundolf S. Freyermuth is a professor of media and game studies and founding director of the Cologne Game Lab at TH Koeln–University of Technology, Arts and Sciences, as well as professor of comparative media studies at the IFS international film school of Cologne. He earned his MA and PhD in comparative literature from the Free University of Berlin. His research concentrates on the history and theory of audiovisual media, particularly film and games, as well as analog and digital textuality and network culture. Gundolf has written and edited more than twenty books of fiction and nonfiction in English and German and published several hundred articles and papers. His most recent English books are *Playing Utopia: Futures in Digital Games* (2019, coedited); *Clash of Realities 2015/16: On the Art, Technology, and Theory of Digital Games. Proceedings of the 6th and 7th Conference* (2017, coedited); *Games | Game Design | Game Studies. An Introduction* (2015). [g@freyermuth.com]

Melanie Fritsch is a ludomusicologist and game studies scholar. Her doctoral thesis, *Performing Bytes: Musikperformances der Computerspielkultur* (*Performing Bytes: Music Performances of Video Game Culture*), was published in 2018, and she is currently working on the *Cambridge Companion to Video Game Music* in collaboration with Tim Summers. She is a member of the Ludomusicology Research Group (www.ludomusicology.org) and coeditor of the Studies in Game

Sound and Music book series (with Intellect Publishing). Further, she cofounded the Society for the Study of Sound and Music in Games (www.sssmg.org) and the *Journal of Sound and Music in Games* (published with University of California Press), is a member (since 2019) of the editorial board of the *Journal of the Royal Musical Association*, and has been co-organizer of the GameCamp Berlin (www.gamecamp.berlin, formerly known as Researching Games BarCamp). She has worked as research assistant at the Research Institute for Music Theatre (University of Bayreuth) between 2008 and 2013 and also taught in its Music Theatre Studies Department (BA/MA). She currently works as a public relations and communications manager in the video game industry, and she also teaches at the Humboldt University of Berlin on a freelance basis. Detailed info on her work can be found at https://independentresearcher.academia.edu/MelanieFritsch. [melaniefritsch@arcor.de]

Mathias Fuchs is a game artist, musician, and media scholar. He pioneered in the artistic use of computer games and exhibited work at ISEA, SIGGRAPH, transmediale, and the Greenwich Millennium Dome. In 2012, he became a professor at Leuphana University in Lüneburg and is currently working at the Institute of Culture and Aesthetics of Media. Publications include *Phantasmal Spaces* (2019), *Diversity of Play* (2015), and “Weltentzug und Weltzerfall,” in *Philosophical Perspectives on Play* (2015). [mathias.fuchs@leuphana.de]

Tracy Fullerton is an experimental game designer, professor, and director emeritus of the USC Games program. Her research center, the Game Innovation Lab, has produced several influential independent games, including *Cloud* (2005), *flOw* (2006), *Darfur Is Dying* (2006), *The Night Journey* (2007) with artist Bill Viola, and *Walden, a Game* (2017), a simulation of Henry David Thoreau’s experiment at Walden Pond, which was named Game of the Year at Games for Change 2017 and Developer Choice at IndieCade 2017. Tracy is the author of *Game Design Workshop: A Playcentric Approach to Creating Innovative Games* (2004, 2008, 2014), a design textbook used at game programs worldwide, and holder of the Electronic Arts Endowed Chair in Interactive Entertainment. Prior to USC, she designed games for companies that include Microsoft, Sony, and MTV, among many others. Tracy’s work has received numerous honors, including an Emmy nomination for interactive television; Indiecade’s Sublime Experience, Impact, and Trailblazer awards; Games for Change’s Game Changer award; the Game Developers Choice’s Ambassador Award, and *Time Magazine*’s Best of the Web.

Anthony Y. H. Fung is a professor in the School of Journalism and Communication at the Chinese University of Hong Kong. He is also a professor in the School of Art and Communication at Beijing Normal University at Beijing, China. His research interests and teaching focus on popular culture and cultural studies, popular music, gender and youth identity, cultural industries and policy, and digital media studies. He has published widely in international journals and authored and edited more than twenty Chinese and English books. His recent books are *Youth Cultures in China* (2016; coauthored with Jeroen de Kloet), *Global Game Industries and Cultural Policy* (2016), and *Hong Kong Game Industry, Cultural Policy and East Asian Rivalry* (2018). [b763704@mailserv.cuhk.edu.hk]

Enrico Gandolfi, PhD, is an assistant professor of educational technology at Kent State University, Ohio. He previously worked as an associate researcher at Luiss "Guido Carli" University of Rome, Italy. His research interests span games and simulations for learning, augmented and virtual reality, accessibility and critical design in education, digital interfaces for special populations, and instructional streaming. He is the author of several journal articles (for *Journal of Gaming & Virtual Worlds*, *Convergence*, *Games and Culture*, *Simulation and Gaming*, *Well-Played*, *E-learning and Digital Media*, *Information Visualization*, *Feminist Media Studies*, and *International Journal of Information and Learning Technology*) and book chapters about these topics and the monographs *Piloti di Console* (2011), *Nerd Generation* (2014), and *Independent Videogames* (2015). He has been co-Principal Investigator and key personnel for projects awarded by the GAR Foundation, the National Science Foundation, and the National Endowment for Humanities. [enrigand@gmail.com]

Manuel Garin is an associate professor in film and media studies at Universitat Pompeu Fabra, Barcelona, where he completed his PhD dissertation, which focused on visual humor and was later published as a book: *El gag visual. De Buster Keaton a Super Mario* (2014). He has been a visiting scholar at different institutions, such as the Tokyo University of the Arts, the University of Southern California, and Columbia University, where he developed the comparative media projects "Gameplaygag: Between Silent Film and New Media" and "A Hundred Busters," which were financed by competitive public grants. His research on cinema, video games, and serial narratives has been published in scientific journals such as *International Journal of Cultural Studies*, *Communication & Society*, *Feminist Media Studies*, *L'Atalante*, *EPI*, and *Comparative Cinema* and in books. As a cultural critic, he has written for magazines such as *La Maleta de Portbou*, *Rockdelux*, *Contrapicado*, and *Cultura/s La Vanguardia*. Trained as a musician, he holds a professional degree in piano and an MFA in film scoring from ESMUC Music School. He is currently editing the digital humanities project "A Hundred Busters: Keaton across the Arts," about the influence of Buster Keaton on different artists throughout the last century. [manuelgarin@gmail.com]

Ben Gill is a graduate of the University of California, Santa Barbara, with a degree in film and media studies and a minor in English literature. Currently living in San Francisco, he was born in Sheffield, England and has since lived in various parts of England, Japan, and California. He has written about music, film, and video games for outlets that include *LA Music Blog* and *GameDynamo*. [benrgill@gmail.com]

Harrison Gish is a doctoral candidate in UCLA's Cinema and Media Studies program. His work appears in the edited collection *How to Play Video Games* (2019) as well as the journals *eLudamos*, *Mediascape*, and *CineAction*. He is a member of the Society for Cinema and Media Studies Video Game Studies Scholarly Interest Group, of which he was the cochair from 2014 to 2017, and the Learning Games Initiative. [harrison.gish@gmail.com]

Anne Githuku-Shongwe is the representative for UN Women's South Africa Multi-Country Office (SAMCO), which is responsible for women's empowerment and gender equality in Botswana, Lesotho, Swaziland, and Namibia as well as South Africa, where the office is based. A key responsibility of her work is to develop women-owned businesses and the leadership capacity of women both in the public and private sectors. Anne is the founder of Afroes Games, a tech education social enterprise with multiple award-winning games. Prior to her new assignment at SAMCO, Anne spent eight years as a globally recognized and pioneering social entrepreneur, digital innovator, and thought leader on technology for development. Anne founded Afroes in 2010 to create innovative educational products to engage and equip African youth with life skills and connect them to future work opportunities. Afroes has received multiple awards, including the UN's PeaceAPP; the MEFFYs Award, London; and Netexplo Award, Paris, among others. Anne was recognized for the prestigious Schwab Social Entrepreneur of the Year 2013 Award. [anne.shongwe@gmail.com]

René Glas is an assistant professor of new media and digital culture in the Department of Media and Culture Studies at Utrecht University. With a background in film and new media studies, his primary field is game studies, in which he teaches and writes about a variety of topics, including game history and culture, cheating and other forms of deviant play, and games/play literacy. Glas is a founding member of Utrecht University's Center for the Study of Digital Games and Play. His book *Battlefields of Negotiation: Control, Agency, and Ownership in World of Warcraft* was published in 2012. In 2019, he coedited *The Playful Citizen: Civic Engagement in a Mediatized Culture*. [r.glas@uu.nl]

Tim Glaser studied literature, art, and media studies at the University of Konstanz and the Charles University in Prague. Since 2016, he has worked as a research assistant at the Institute for Media Studies at the Braunschweig University of Art, and he is a PhD candidate. His research interests include video game culture, comic studies, and speculative fiction. A recent publication is "Oh No—This Comic Is Literally Me. Webcomics im Zeitalter ihrer memetischen Rezeption" in *CLOSURE: Kieler e-Journal für Comicforschung*, issue 4.5, "Formen der Selbstreflexivität im Medium Comic," edited by Nina Heindl and Véronique Sina (2018). His website is www.timglaser.de. [t.glaser@hbk-bs.de]

Eitan Glinert is the founder of Fire Hose Games, the Boston-based game studio behind *Slam Bolt Scrappers* and *Go Home Dinosaurs*. He did graduate research at the Massachusetts Institute of Technology on highly usable and accessible video game interfaces. He is especially impressed that you are reading this and cannot wait to play your game. [glinert@gmail.com]

Christopher Goetz is an assistant professor of cinematic arts at the University of Iowa. A film, digital media, and video game scholar, Chris's research focuses on fantasy and play across media. His published works have appeared in *Games and Culture*, *Game Studies: The International Journal of Computer Game Research*, *Camera Obscura*, *New Media & Society*, *The Psychoanalytic Study of the Child*, and an edited volume on queer game studies. His book project, *The Counterfeit Coin: Videogames and Fantasies of Empowerment,* is currently under review. He is one of the founding organizers of the Queerness and Games Conference. [christopher-goetz@uiowa.edu]

Martin "Retro Rogue" Goldberg is a Gen Xer who has been a video game fan since first walking into a bowling alley back in the 1970s and playing *PONG*. He received his nickname from his willingness to go to thrift stores and pawnshops in areas others will not go near, usually inspiring the comment, "Marty, I'm not about to get killed over an Atari cartridge!" Besides working in the video game industry as a programmer and technical writer, he is also a professional industry historian and member of the International Game Developers Association Preservation Special Interest Group. A regular contributor to the award-winning *Retro Gamer* magazine and the former site director of IGN/GameSpy's ClassicGaming.Com, Marty is currently working on several books and archiving projects with noted Atari historian and archiver Curt Vendel. Marty is also the cofounder of the Midwest Gaming Classic, one of the largest fan-based video game shows in the United States. His quest for knowledge and passion for archiving has also resulted in the Electronic Entertainment Museum archives, a portion of which can be seen every year at the Midwest Gaming Classic. [wgungfu@gmail.com]

Racquel M. Gonzales is a doctoral student in the Department of Visual Studies at the University of California–Irvine. She obtained an MA in media studies from the Department of Radio-Television-Film at the University of Texas at Austin. Her research interests include historiography, genre theory, performance studies, and the intersections among gaming, histories of technology, and the spectacle. [racquelmgonzales@yahoo.com]

Sebastián González Canepa has been involved in the video game industry for over a decade at top Chilean development houses and is also an interactive media professor. For the past few years, he has worked as a producer at indie game development company ACE Team and previously at Wanako Games (acquired in 2008 by Behaviour Interactive). He currently teaches at Instituto Profesional Arcos, Santiago. He holds a BFA in interactive design and game development from the Savannah College of Art and Design. From 2008, he was an instructor for the Experimental Development Workshop at Universidad de las Américas until 2010, and in 2011, he became a professor and co-creator of the curriculum of the Videogame Development and Digital Animation track at Universidad del Pacífico, the first professional video game career program in Chile. He is also the former vice president of the Videogames Chile Trade Association VGChile. He has worked on more than a dozen games for all major platforms, the most memorable being the *Rock of Ages* and *Zeno Clash* sagas. [hola@moresebastian.com]

Paweł Grabarczyk is a postdoctoral researcher at IT University of Copenhagen. He is an analytic philosopher who worked on philosophy of language (mostly theories of meaning) and philosophy of mind (mostly the problem of mental representations). His current work explores the boundaries between philosophy, computing, and game studies. His recent work involves game ontology, the study of independent games, and virtual reality. He is also interested in the history of computing and gaming platforms. [pawg@itu.dk]

Louis-Martin Guay is an assistant professor of game and interactive design at the University of Montréal, Canada. With a bachelor's degree in drama and a master's degree in film studies, he has been involved in game design for more than twenty years. His research focuses on learning in games, a systemic approach to game design, narrative and the aesthetic history of pinball machines, and the relation between video games and heavy metal music. [louis.martin.guay@uMontreal.ca]

Stephan Günzel is a professor of media science at the Technical University of Berlin. His research interests include first-person shooter games, phenomenology, concepts of space, media theory, and game studies. His publications include *Ludotopia: Spaces, Places and Territories in Computer Games*, edited with Espen Aarseth (2019). [stephan.guenzel@tu-berlin.de]

Ian Hamilton is a game accessibility specialist with a thirteen-year background in raising the bar for gamers with disabilities through advocacy, raising awareness (writing, speaking, organizing events, and community building), and consulting (working with studios from the smallest indies to the largest triple-A game makers, with publishers, platforms, industry, and government bodies). He is also codirector of GAconf and coordinator of http://gameaccessibilityguidelines.com. [i_h@hotmail.com]

Christopher Hanson is an associate professor in the English Department at Syracuse University, where he teaches courses in games studies, digital media, television, and film. His book *Game Time: Understanding Temporality in Video Games* was published in 2018, and his next book project is on game designer Roberta Williams. He previously worked for a number of years in video game and software development. [cphanson@syr.edu]

Todd Harper is an assistant professor in the Simulation and Game Design program at the University of Baltimore. His scholarly work ranges from work in esports and competitive fighting games, to queer and gender representation issues, to the ways that games construct body types, but he is also active in the critical community and industry as a writer and advocate. He tries to be angry in a constructive way via twitter at @drtoddharper. [tharper@ubalt.edu]

Philip Hausmeier received his diploma in communication design from the University of Applied Sciences Düsseldorf in 2003 and his MFA from the Slade School of Art London in 2005. Between 2005 and 2015, he worked as an artist internationally, with a focus on immersive spatial installations. In 2013, Hausmeier saw the potential of VR/AR/MR technologies for design and art and since then has exclusively worked with these media. In 2016, he founded the company Metaphysics as part of an accelerator in Silicon Valley to create structures that bring virtual reality and the arts together. Resulting exhibitions have been shown at the Computer History Museum in Mountain View, California; the Zabludowicz Collection in London; and the ZKM in Karlsruhe, Germany. In 2017 he cofounded the VR art database RadianceVR.co, which currently presents over one hundred international VR artworks and exhibits them in cooperation with museums and other partners. He is cofounder and UX designer of Meshicon Software, a mixed reality company that provides interface solutions for the Microsoft HoloLens. In addition, he organizes the Virtual Reality Berlin Meetup (VRBLN), one of the largest communities for VR with over thirty-three hundred members. He has been also lecturing on virtual reality and mixed reality at several universities in Berlin for the past five years. [mail@philiphausmeier.com]

Mark Hayse is a professor of Christian education at MidAmerica Nazarene University in Olathe, Kansas. His publications on video games include "Ultima IV: Simulating the Religious Quest" in *Halos and Avatars: Playing Video Games with God* (2010), entries in *The Concise Dictionary of Pop Culture and Theology* (forthcoming), and a chapter in *The Legend of Zelda and Theology* (forthcoming). His research interests include curriculum theory, theology, and ludology. [mahayse@mnu.edu]

Leonard Herman, or "The Game Scholar," fell in love with video games the first time he played *PONG* at a local bowling alley in 1972. A programmer and technical writer by trade, Herman founded Rolenta Press in 1994 to publish his book *Phoenix: The Fall & Rise of Videogames*, the first serious book on video game history, which, in 2008, *Game Informer* magazine called the second-best book about video games ever written. The current fourth edition of the book, now called *Phoenix IV: The History of the Videogame Industry*, is the most comprehensive video game history book ever written. Herman has written articles about video games for *Electronic Gaming Monthly*, *Edge*, *Games*, *Videogaming Illustrated*, the *Official US PlayStation Magazine*, and many other magazines. He also wrote chapters for books such as *Supercade* (2001) and *The Video Game Explosion* (2007) and edited Ralph Baer's book *Videogames: In the Beginning* (2005). He also wrote game manuals for eight Atari VCS and two Magnavox Odyssey^2 games. In 2003, Herman was given a Classic Gaming Expo Achievement Award. An adviser to the National Videogame Museum, Herman resides in New Jersey with his wife, Tamar. [lenny@rolentapress.com]

Alejandro Iparraguire is a higher technician in marketing and an electronics technician, is a producer, designer, and cultural manager promoting the video game industry. He is a full professor of the Bachelor of Electronic Arts at the National University of Tres de Febrero and professor of playful culture of the Bachelor of Design at the University of San Andrés. He currently stands out in the video game development industry as a founding member of FundAV (Fundación Argentina de Videojuegos), and he is coordinator of the video game area for the Ministry of Culture of the Argentine Nation. His specific work is as a playful designer and producer in the coordination of the development team and as a consultant for production, human resources, marketing, and communication in the video game sector. Outstanding creation and participation projects include Game Work Jam (a video game development promotion event) and *Element Space* (a science fiction video game). [aleiparraguirre@gmail.com]

Joshua Jarrett is a lecturer specializing in esports at Staffordshire University. After completing his PhD in 2019, Josh's research focused on a playfully co-creative approach to understanding the political economy of multiplayer online battle arena games. Josh's ongoing research interests include affective understandings of in-game microtransactions, ethnographic research into grassroots esports cultures, and critical political economic analysis of esports global development. [joshua2jarrett@live.uwe.ac.uk]

David Javet is one of the cofounders of the UNIL Gamelab at the University of Lausanne. He is a board member of the Swiss Game Developers Association (SGDA) as well as the coordinator of monthly game developers' gathering in the French-speaking part of Switzerland. In parallel with his research activities, he works as a curator for the Numerik Games Festival in Yverdon-les-Bains. David is also a narrative designer and producer at Tchagata Games, a game design creative hub based in Lausanne. [david.javet@unil.ch]

Jennifer Jenson is an associate professor of pedagogy and technology in the Faculty of Education at York University. She has published on gender and gameplay, gender and technology, and the design and development of digital games for education. She and a team of students recently completed a health-based game, *Epidemic: Self-Care for Crisis*, and she is coeditor of *Loading: The Journal of the Canadian Game Studies Association*. [jjenson@edu.yorku.ca]

Ashley P. Jones is a PhD student in Georgia State University's Moving Image Studies program with an emphasis in feminist media studies and digital game studies. She is currently working on research exploring the feminist and queer aesthetics and mechanics within digital gaming. She has written on the nostalgic effects of Lara Croft in the *Tomb Raider* game series as well as the hauntological aspects of the game *Tacoma*. [ajones306@student.gsu.edu]

Rhys Jones is a PhD candidate studying fan cultures and games at the Hong Kong Polytechnic University. He has published papers on room escape games, sociopolitical representations of Hong Kong in video games, and transgressive gameplay practices. [rhys.gj@hotmail.co.uk]

Kristine Jørgensen is a full professor in media studies at the University of Bergen, Norway. Her research interests include the relationship between games and players, game aesthetics, and the Norwegian game industry. She is the author of *A Comprehensive Study of Sound in Computer Games* (2009) and *Gameworld Interfaces* (2013) and is the main editor of *Transgression in Games and Play* (2019). Her book *The Paradox of Transgression in Games* (with Torill Elvira Mortensen) was published in 2020. [Kristine.Jorgensen@uib.no]

Jesper Juul is an associate professor at the Royal Danish Academy of Fine Arts, School of Design, and has developed several master's-level programs in game design at the ITU of Copenhagen, at the New York University Game Center, and at KADK in Copenhagen. He has published four books: *Half-Real* (2005), *A Casual Revolution* (2009), *The Art of Failure* (2013), and *Handmade Pixels* (2019). He is also a coeditor of the Playful Thinking Series. [j@jesperjuul.net]

Radwan (RAD) Kasmiya is a pioneering game creator and serial entrepreneur in the Middle East and China, having created the first video game and computer-generated animation there and many best sellers, such as *Under Ash* (2001), the first first-person shooter video game in the Middle East; *Quraish* (2005), a real-time strategy game; *Under Siege* (2004); *Road to Jerusalem* (2009); *Knights of Glory* (2012); and *Swords of Glory* (2018). Kasmiya was awarded the Creative Young Entrepreneur Award in Syria in 2007 as founder of AfkarMedia, cofounded Falafel

Games Ltd (2011) and WafaGames (2017) in China, and has worked on many gaming projects with Disney-Pixar, THQ, Ubisoft, EA, and others on titles such as *BattleField 2* (2005), *Assassin's Creed* (2007), *World in Conflict* (2007), *Far Cry 2* (2008), *Tom Clancy's EndWar* (2008), *WALL•E* (2008), *Red Faction: Guerilla* (2009), and *Up* (2009). Kasmiya holds an electronic/computer engineering degree from the University of Damascus and is passionate about interactivity and AI evolution in video games. [kasmiya@gmail.com]

Dafna Ester Kaufman is a first year PhD student in communication at UNC–Chapel Hill. She completed her MA in the School of Film, Media and Theatre at Georgia State University. She also received a certificate in Women and Gender Studies (at Georgia State). Her general research interests are sports media, affect theory, gender theory, critical race theory, and cultural studies. [dkaufman1@student.gsu.edu]

Andrew Kemp-Wilcox is a doctoral candidate in the School of Film, Media, and Theatre at Georgia State University in Atlanta. Andrew's background as a game designer, narrative designer, and producer in the social and mobile game space has influenced his doctoral research toward the textual elements of digital games, including narrative, aesthetics, mechanics, and ludic opposition. [wkemp2@student.gsu.edu]

Brendan Keogh is an Australian Research Council DECRA Fellow in the Digital Media Research Centre, Queensland University of Technology. He is the author of *A Play of Bodies: How We Perceive Videogames* (2018) and *Killing Is Harmless: A Critical Reading of* Spec Ops: The Line (2012) and has written extensively about the cultures and development practices of video games for outlets such as Overland, the Conversation, Polygon, Edge, and Vice. [brendan.keogh86@gmail.com]

Aphra Kerr has a PhD in communication studies (2000) and is an associate professor in the Department of Sociology at Maynooth University, Ireland. She has been researching digital games for almost twenty years and founded the community website www.gamedevelopers.ie. She is co–principal investigator on the "Refiguring Innovation in Digital Games" project and a collaborator of the ADAPT SFI Centre for Digital Content Technology. In 2016, she received a Distinguished Scholar award from the international Digital Games Research Association (DiGRA). She currently serves as an expert adviser to the Pan European Games Information (PEGI) system and is a member of the Media Literacy Ireland network. She has held visiting fellowships at the University of Edinburgh (2019) and the University of Pennsylvania (2011). Aphra's books include *Global Games: Production, Circulation and Policy in the Networked Age* (2017), and she coedited *The International Encyclopedia of Digital Communication and Society* (2015). See more at https://www.maynoothuniversity.ie/people/aphra-kerr. [aphra.kerr@mu.ie]

Wesley Kirinya was born in 1983 in Nairobi, the capital city of Kenya. I have lived most of my life in Nairobi. I went to Consolata High School and graduated in 2001. I got my first job right after high school. I taught computers to children between the ages of nine and eleven. It was a very interesting challenge. I would say that I learned a lot of patience and understanding from the children. My heart was more in software development than teaching. I had a lot of free time on my hands, so I began developing software part-time. I had a good background in software development from high school. My first commercial software was a school management system integrated to a school's website. My second software was the Kenya Catholic Directory, a directory that maintains contact information of activities and institutions of the Catholic community in Kenya. I then joined the University of Nairobi for Computer Science. However, I had done a lot of work in computers before I joined the university and therefore changed my focus to actuarial science because I was interested in mathematics. I had set my mind on making games as a career by the time I joined university, but I still needed to know more about game development. I bought books and manuals from the United States. After my second year of university, I deferred my studies to develop *Adventures of Nyangi* (2007), the first game I developed. Because of the game, I won an award as Africa's Top ICT Youth Innovator in 2008 and made valuable contacts in the professional game development industry. I needed more experience in professional software development and joined Genkey Africa, located in Ghana, as a senior software developer. After one year, I cofounded Leti Games in Ghana. I am married with no children. [wesley@letigames.com]

Carly A. Kocurek is a doctoral candidate in American Studies at the University of Texas at Austin. Her current research focuses on the relationship between early video gaming, the production of masculinity, and the social and economic upheaval of the 1970s and 1980s. She holds an MA in American studies from the University of Texas. She is coauthor of *Republic of Barbecue: Stories beyond the Brisket* and a former senior editor of *Flow*, an online journal of television and media studies. At present, she is completing a series of oral history interviews related to early video game culture. [womanofkleenex@gmail.com]

Kyle Kontour has an MA in film and media studies from the University of Otago and a PhD in communication from the University of Colorado–Boulder. His research is broadly concerned with game studies and new media, with a particular emphasis on the military entertainment complex and its impact on, and relationship to, cultural production, gender, performance, discipline, and the conduct of war. His previous work has appeared in the journals *Refractory* and *Digital Culture and Education*. [kkontour@gmail.com]

Lars Konzack is an associate professor in information studies at the Department of Communication (COMM) at the University of Copenhagen (UCPH). Konzack has an MA in information science and a PhD in multimedia from Aarhus University. He is also cofounder of the game developing academy DADIU. His fields of studies are ludology, geek culture, and imaginary worlds, and his publications include "Computer Game Criticism: A Method for Computer Game Analysis," "The Cultural History of LEGO," "Mark Rein•Hagen's Foundational Influence on 21st Century Vampiric Media," and "Viking Re-Enactment." [lars@konzack.dk]

Tanya Krzywinska is author of a range of papers and books that seek to distinguish the formal and aesthetic characteristics of games. She has also written extensively on the Gothic and horror in relation to game form. Tanya was an early member of DIGRA, acting as president in 2006 until 2010. Since 2014, she has been editor in chief of the peer-reviewed journal *Games and Culture*. Tanya has convened a range of games courses that provide students with the experience, knowledge, and skills needed for employment in the games industry. Tanya holds the chair in digital economy at Falmouth University, Cornwall, United Kingdom, and is director of the Games Academy that provides incubation-based and innovation-led game development and game art courses (www.falmouth.ac.uk/games). Given time, Tanya continues to practice as an artist. [tanya.krzywinska@falmouth.ac.uk]

Julian Raul Kücklich is an independent new media researcher. He has been conducting research on the aesthetics, politics, and semiotics of digital games since 2001 and has published a number of papers on these topics in journals such as *Convergence*, *Game Studies*, and *Games & Culture*. He is also the author of *Playability* (2008). [julian@kuecklich.de]

Laura Iseut Lafrance St-Martin is a lecturer in communication and a PhD student in semiology at the University of Quebec in Montreal (UQAM), for which she was awarded a scholarship from the Quebec Research Fund–Society and Culture (FRQSC). Her thesis focuses on J. R. R. Tolkien’s semiotic theory. She is a research assistant for the research chair on big data and gaming communities and an active member of the Homo Ludens research group and the Research Group on Everyday Information and Surveillance (GRISQ). She has written journal articles and book chapters about video games, gaming communities, and the semiotic analysis of big data. [iseut.lafrance@gmail.com]

Nicolle Lamerichs is a senior lecturer and team lead in creative business at HU University of Applied Sciences, Utrecht. She holds a PhD in Media Studies from Maastricht University (2014). In her book *Productive Fandom* (2018), she explores intermediality, affect, costuming, and creativity in fan cultures. Her research focuses on participatory culture and new media, specifically the nexus between popular culture, storytelling, and play. [n.a.lamerichs@gmail.com]

Michael Liebe is CEO and founder of Booster Space, the company behind Gamesweekberlin, the QUO VADIS conference, Gamefest, VR NOW Con & Awards, Womenize!, and many other events driving to connect the business, technology, and culture of games, VR, and other media. The company also developed and published the game *DUEL VR* (2017). Michael is an advocate of crowdfunding and supports Kickstarter as Games Outreach in Europe since January 2016. In the times before Booster Space, he co-initiated the indie games and art festival, A MAZE., the Digital Games Research Centre of the University of Potsdam (DIGAREC), and the Computer Games Collection of European Media Studies at the University of Potsdam, the European Master’s program, Ludic Interfaces, and the Games:net Berlinbrandenburg. Until 2012, he was the adviser of new media at the Medienboard Berlin-Brandenburg and was responsible for marketing and networking for the “new media” industry in the German capital region. He holds an MA in European media studies and is an adviser and jury member and works as university lecturer at UE Germany. [michael.jw.liebe@googlemail.com]

Henry Lowood is Harold C. Hohbach Curator, History of Science & Technology Collections and Film & Media Collections, at Stanford University. He is a lecturer in the Science, Technology, and Society Program and the Film and Media Studies Program at Stanford. Since 2000, he has led the How They Got Game Project in the Stanford Humanities Laboratory (SHL) and the Stanford Libraries, a research project focused on the history of computer games and simulations; between 2004 and 2008, he also served as codirector of the SHL. Among the many initiatives undertaken by the How They Got Game Project are the Machinima Archive and the Archiving Virtual Worlds collection, for which he is curator, hosted by the Internet Archive. He also led Stanford's work on the Preserving Virtual Worlds project and the Game Citation project. He has published widely on the history of science and technology, library and archival studies, and digital game studies. For more information, visit https://lowood.people.stanford.edu/curriculum-vitae. [lowood@stanford.edu]

Martin Lüthe is currently an assistant professor at the John F. Kennedy Institute for North American Studies at Freie Universität Berlin. Lüthe published the monographs *"We Missed a Lot of Church, So the Music Is Our Confessional": Rap and Religion* (2008) and *Color-Line and Crossing-Over: Motown and Performances of Blackness in 1960s American Culture* (2011). He is working on *Habilitation Wire Writings: Media Change in the Culture of the Progressive Era*. He keeps buying the new PES every year and tells himself that it is somehow better than the one before. [martin.luethe@fu-berlin.de]

Vincent Mauger is a PhD student in the Design and Digital Culture Ad Hoc Doctoral Program at Université Laval, Québec City, where he is part-time lecturer and research professional in UX design. He also taught at Université de Montréal and Université du Québec en Abitibi-Témiscamingue. Most of his courses focus on interactive storytelling, video game design, and screenwriting. His research interests include narrative design, transmedia storytelling, video game characters, and fictional worlds as well as design epistemology. He contributed to the Homo Ludens Research Group and NT2 Lab at the Université du Québec à Montréal and currently works at the Urban Science Joint Research Unit (UMRsu) in partnership with Co-DOT, a cognitive ergonomics research laboratory at Université Laval. [vincent.mauger@design.ulaval.ca]

Frans Mäyrä is a professor of interactive media, game studies, and digital culture at the University of Tampere in Finland. He has studied the relationship of culture and technology since the early 1990s. He specializes in the cultural analysis of technology, particularly on the ambiguous, conflicting, and heterogeneous elements in this relationship, and has published on topics that include information technologies, science fiction and fantasy, the demonic tradition, the concept of identity, and role-playing games. He is currently teaching, researching, and heading numerous research projects in the study and development of games, new media, and digital culture. He has also served as the founding president of the Digital Games Research Association (DiGRA). His publications include

Koneihminen (editor; Man-Machine, 1997), *Demonic Texts and Textual Demons* (1999), *Johdatus digitaaliseen kulttuuriin* (editor; Introduction to Digital Culture, 1999), *CGDC Conference Proceedings* (editor, 2002), *Lapsuus mediamaailmassa* (editor; Childhood in the World of Media, 2005), *The Metamorphosis of Home* (editor, 2005), and *An Introduction to Game Studies* (2008). [frans.mayra@uti.fi]

Ken S. McAllister is a professor of rhetoric and the College of Humanities associate dean of Research and Program Innovation at the University of Arizona. [mesmer@email.arizona.edu]

Greg McLemore is a lifelong enthusiast of coin-operated and amusement technology, history, and culture. Among Greg's other responsibilities, he serves as the executive director of the Museum of the Game (including the International Arcade Museum, the Killer List of Videogames, Penny Arcadia, and the Vintage Arcade Preservation Society). He also serves as a director of the nonprofit International Arcade Museum Library. In recent years, Greg has assembled a leading collection of amusement and arcade art, history, memorabilia, and machines, including the first three floor model coin-operated arcade machines made by man (each the only specimen surviving), the first coin-operated kiddie ride, and numerous coin-op and console video game prototypes and rarities.

Greg grew up playing an Atari 2600 and text adventure and arcade games on an Apple IIe. In 1983, he launched one of the first online electronic bulletin board systems, primarily serving video game enthusiasts. The service quickly added one of the first text adventure games playable online that was available to anyone in the world with a modem and, just a few years later, one of the online role-playing adventure games featuring simultaneous multiperson play. Today, his favorite machines to play are penny arcade machines made before 1930 and golden age coin-operated video games made between 1978 and 1983. Besides his involvement with arcade history preservation, he is a successful serial entrepreneur, having started dozens of businesses in the technology, real estate, and media industries. Greg lives with his family in Los Angeles, California. [mclemore@webmagic.com]

Kyle Moody is an assistant professor in communications media at Fitchburg State University. His research is broadly focused on social media and online communities, with a focus on how convergent media users are involved in the production and dissemination of user-generated content. He has published multiple works on the intersection of games and users, including "*Ico* and *Shadow of the Colossus*: The Importance of Companion Characters in Lonely Landscapes" (2017) and "The End of the Dream: How *Grand Theft Auto V* Simulates and Subverts Its Male Player-Character Dynamics" (2017). He is currently working on a book broadly focused on fake news and culture. [kmoody4@fitchburgstate.edu]

Sebastian Möring is an assistant professor in European media studies, a joint study program of the University of Potsdam and the University of Applied Sciences Potsdam, Germany, and head coordinator of the DIGAREC (Digital Games Research Center of the University of Potsdam). His research focuses on the philosophy and aesthetics of computer games, in-game photography, and representations and functions of climate in computer games. Sebastian earned his PhD from the Center for Computer Games Research at the IT University of Copenhagen with a thesis on the metaphor discourse in game studies. He researched existential structures of computer games as a postdoc at the School of Creative Media, City University of Hong Kong. Sebastian is involved with the Gamephilosophy Network and an organizer of the annual Philosophy of Computer Games conference. For publications and more information, please visit http://sebastianmoering.com. [smoering@uni-potsdam.de]

Souvik Mukherjee is currently employed as an assistant professor of English literature at Presidency University (previously Presidency College), Calcutta. Souvik has been researching video games as an emerging storytelling medium since 2002 and completed his PhD on the subject at Nottingham Trent University in 2009. He has done postdoctoral research with the Humanities faculty of De Montfort University, United Kingdom, and as a research associate at the Indian Institute of Technology in New Delhi, India, where he worked on digital media as well as narrative analysis. His research examines their relationship to canonical ideas of narrative and also how these games inform and challenge current conceptions of technicity, identity, and culture, in general. His current interests involve the representations of empire in video games; the analysis of paratexts of video games, such as walkthroughs and after-action reports; and the concept of time and telos in video games. His research has been published in *Journal of Gaming and Virtual Worlds* and *Writing Technologies* as well as in various edited collections on game studies and popular culture. His other interests are digital humanities and early modern and classical literature. Souvik regularly writes about his research on his blog *Ludus ex Machina* (http://readinggamesandplayingbooks.blogspot.com/) and welcomes comments and feedback. As a gamer, he prefers strategy games, although he is a big fan of *Fallout 3* and the *STALKER* games. [prosperosmaze@gmail.com]

Sheila C. Murphy is an assistant professor in the Department of Screen Arts & Cultures at the University of Michigan. Her work and teaching are centered around new media theory, video games, internet media, and cultural reception. She is the author of *How Television Invented New Media* (2011). She believes that video games are crucial to understanding contemporary media culture and to the study of new media because video game systems truly were the first “PCs.” Her next project explores how geek culture emerged alongside cute culture online—from sprites to Strong Bad and beyond. [scmurphy@umich.edu]

Gathoni Mwai is a sustainable development professional who has spent the last eight years working on social development issues in Africa and focusing on the use of data, technology, and innovation for development. Having been brought up in Kenya, she is passionate about the country, its people, and in making an impact to improve the livelihoods of the most vulnerable in society. Gathoni holds a bachelor’s degree in social science (anthropology, geography, and international relations) from Durham University. She joined Afroes as a project manager for the development of *Haki II: Chaguo Ni Lako* (*Justice: The Choice Is Yours*; 2013), the PeaceApp award-winning mobile game that was used for peace building in Kenya in the run up to the 2013 elections following the postelection violence experienced in August 2007. Having completed her master's in sustainable development corporate responsibility, Gathoni returned to Afroes, where she has taken on the role of Kenya programme manager, and she is tasked with scaling the Afroes Games catalogue, developing multistakeholder partnerships, and managing several pan-African projects. [gathoni@afroes.com]

Andrei Nae, PhD, is an assistant lecturer at the University of Bucharest, where he teaches American literature and English language courses. In 2017, he defended his doctoral thesis, entitled *Immersion and Narrativity in the Survival Horror Genre*, and has published multiple articles and chapters on topics such as video game cultural studies and the relationship between video games and literature. He is currently working on a research monograph, *Immersion, Narrative, and Gender Crisis*, which elaborates on the argument of his dissertation. [andrei.nae@lls.unibuc.ro]

Víctor Navarro-Remesal is a researcher in game studies and a specialist in East Asian studies. As an assistant professor at CESAG (Comillas Pontifical University), in Palma (Spain), he teaches video games, interactive narrative, and animated cinema. His research interests are player freedom; Zen Modes and Zen-inspired games; Japanese games, or gêmu; and game preservation. He has published many papers and book chapters on those matters and is the author of *Libertad dirigida: Una gramática del análisis y diseño de videojuegos* (2016) and *Cine Ludens:50 diálogos entre el cine y el juego* (2019) and is a coauthor of *Game&Play: Diseño y análisis del juego, el jugador y el sistema lúdico* (2015). [vnavarro@gmail.com]

David Nelson serves as director of adjudication services for Twin Galaxies International and is also considered one of the top arcade game players, holding multiple world records, particularly on the older "monochrome" titles. He grew up in Laconia, New Hampshire, and has always been a video game enthusiast, ever since his days of playing Atari 2600 nearly every day after elementary school. His fascination with video games was nurtured by growing up in the same town as what is now the largest video game arcade in the world, Funspot. His ability as a player was unparalleled in his community, although no one knew it. This was of course during a time when video gaming was considered to be a waste of time and was only pursued by geeks and nerds and people with no life; it was, however, the one thing he truly excelled at. He had always wished there was some way he could put his skills to use and be recognized for his talents in gaming.

It was not until 1999 that he discovered Twin Galaxies, when it came to his hometown to cohost the first International Classic Video Game Tournament. It was here that he met many gaming legends as well as industry icons such as Walter Day. Following this event, he joined the New Hampshire Pro Video Game Team, soon helping to cocaptain and later head up the team himself, which he renamed the NH Video Warriors (which sounded much cooler!). He quickly immersed himself in the sport of competitive video gaming, and in 2000, he joined the staff of Twin Galaxies as a referee. Over the next decade, he continued his passion for gaming and competition by participating in many tournaments and hosting contests of his own; he soon became a top competitor. He dedicated a lot of his efforts to helping other players become recognized champions with Twin Galaxies and eventually moved up the ranks to become chief of the referee team in 2008. Today, he strives to inspire video game players all over the world to play their best and leave their mark in the sport of competitive video gaming, a job that he feels he has always been destined to do.

Benjamin Wai-ming Ng is currently a professor of Japanese studies at the Chinese University of Hong Kong, where he teaches and researches Japanese popular culture and Japan–Hong Kong relations. He received his doctorate in East Asian studies from Princeton University in 1996 and was an assistant professor in Japanese studies at the National University of Singapore from 1996 to 2001. He is working on a research project on the interaction and collaboration between Japan and Hong Kong in the ACG (anime-come-game) industry. [waimingng@cuhk.edu.hk]

Benjamin Nicoll is a lecturer in media and communication and a member of the Digital Media Research Centre in the School of Communication at Queensland University of Technology. He is the author of *Minor Platforms in Videogame History* (2019) and coauthor, with Brendan Keogh, of *The Unity Game Engine and the Circuits of Cultural Software* (2019). [b2.nicoll@qut.edu.au]

Michael Nitsche is an associate professor at the Georgia Institute of Technology in Atlanta, where he leads the interdisciplinary Digital World and Image Group, which focuses on the interconnections between digital and physical spaces. He is the author of *Video Game Spaces* (2009), and he is coeditor with Henry Lowood of *The Machinima Reader* (2011). His current work focuses on digital media as a means of self-expression and human performance. [michael.nitsche@lcc.gatech.edu]

Rolf F. Nohr is a professor of media aesthetics and media culture at Braunschweig University of Arts and an external affiliate at the College of Humanities, University of Arizona. His recent publications are *Unternehmensplanspiele 1955–1975. Die Herstellung unternehmerischer Rationalität im Spiel* (2019) and *The Cake Is a Lie! Polyperspektivische Betrachtungen des Computerspiels am Beispiel von Portal*, edited with Thomas Hensel and Britta Neitzel (2015). [fitzenohr@gmx.de]

David O'Grady is a doctoral candidate in the Cinema and Media Studies program at UCLA. His most recent publications include a chapter on Nintendo's D-pad controller in the anthology *How to Play Video Games* (2019), a chapter on cutscenes and time in video games in *The Game Culture Reader* (2013), and an essay on Wes Anderson's *The Life Aquatic with Steve Zissou* (2004) for the journal *New Review of Film and Television Studies* (March 2012). David is currently a researcher and coordinator in the UCLA Game Lab, a board member of *[in]Transition: Journal of Videographic Film & Moving Image Studies*, and an instructor at California State University, Long Beach. His dissertation examines video game interactivity and the implications of interface design and use on the experience of play. [david@davidogrady.com]

Minako O'Hagan is an associate professor in the School of Cultures, Languages, and Linguistics at the University of Auckland. Specialized in applied translation studies, she has been involved in technology-oriented research from interdisciplinary perspectives. For the last decade, her main research interest has been game localization and nonprofessional translation. Her coauthored publication *Game Localization* (O'Hagan and Mangiron, 2013) is the first major monograph on the topic in translation studies. [minako.ohagan@auckland.ac.nz]

Maria Luján Oulton is a cultural producer and curator specialized in experimental art video games. She has a degree in public and institutional relations and a master's degree in communication and cultural creation by the Walter Benjamin Foundation (thesis awaiting jury). She is cofounder of the Latin American Meeting of Videogames, GAIA (Game Arts International Assembly) and cofounder of the cultural producer Objeto a, focused on art and technology. She is dedicated to the divulgation of experimental and artistic video games, fostering their insertion in the cultural field and encouraging female participation in the industry. She has given talks and participated in events such as TEDx Riodelaplata (Buenos Aires), Jorge Tadeo Lozano University (Bogotá), DevHourmx (Mexico City), and DiGRA (Melbourne, Australia), among others. [lujan.oulton@objeto-a.com.ar]

Caren Pagel is a doctoral candidate in moving images studies at Georgia State University. Her research interests include video game cultures, conflicts between industry and players over agency and ownership, and the relationship between player game labor and the rise of player-led controversies. [cpagel1@gsu.edu]

William Clyde Partin III is a doctoral candidate in communication at the University of North Carolina. His research examines the impact of platformization on cultural industries, especially video games, livestreaming, and esports. He is also a research affiliate at UNC's Center for Information, Technology, and Public Life, where he examines knowledge-making practices in far-right conspiracy communities. He publishes in journals such as *Surveillance & Society* and *Social Media + Society* and writes about culture and technology for popular outlets such as *The Atlantic*, *Vice*, and *Jacobin*. [wcpartin@live.unc.edu]

Matthieu Pellet is a lecturer at the University of Lausanne and is finishing his PhD on the heroic figure in Mediterranean antiquity. Of course, he was also bathed in video games since his childhood and continues to spend a lot of time with them. He was an organizer and speaker at the first Swiss international academic conference, Powers of Video Games: From Practices to Discourses, and also held a class called Video Games and Virtual Worlds at the Swiss Federal Institute of Technology Lausanne (EPFL). Matthieu is also graphic designer and cofounder of Tchagata Games, a creative hub dedicated to the exploration of gaming, in whatever form or support. [matthieu.pellet@unil.ch]

John Reid Perkins-Buzo is interested in the areas where technologies of the past and present meet the arts of the moving image (animation, cinema, and gaming). He has advanced degrees in both the fine arts and applied mathematics/computer science. He continues to develop software for moving image projects, including for a variety of wearable devices. He is an assistant professor of digital media in the Radio-TV-Digital Media Department at Southern Illinois University, Carbondale. [reidop@mac.com]

Bernard Perron is a full professor of film and games studies at the University of Montreal. He has coedited *The Video Game Theory Reader* (2003), The *Video Game Theory Reader 2* (2008), *The Routledge Companion to Video Games Studies* (2014), *Figures de Violence* (2012), *The Archives: Post-Cinema and Video Game between Memory and the Image of the Present* (2014), *Z pour Zombies* (2015), and *Video Games and the Mind: Essays on Cognition, Affect and Emotion* (2016). He has edited *Horror Video Games: Essays on the Fusion of Fear and Play* (2009). He has also written *Silent Hill: The Terror Engine* (2012) for the Landmark Video Games book series he is coediting, and *The World of Scary Video Games: A Study in Videoludic Horror* (2018). His research and writings concentrate on video games, interactive cinema, the horror genre, and narration, cognition, and the ludic dimension of narrative cinema. More information can be found at his research team website: http://www.ludov.ca/. [bernard.perron@umontreal.ca]

Martin Picard is a visiting lecturer and research associate at the Department of East Asian Studies in Leipzig University. His teaching and research interests cover Japanese video games and cinema as well as video game history and aesthetics. He has published articles in journals such as *Game Studies* and chapters in anthologies such as *The Routledge Companion to Video Game Studies* (2014), *The Video Game Theory Reader 2* (2008), *Horror Video Games: Essays on the Fusion of Fear and Play* (2009), and *The Video Game Explosion: A History from PONG to PlayStation and Beyond* (Greenwood Press, 2007). [martinpicard@videotron.ca]

Rachel F. Pickett is an associate professor of psychology at Concordia University Wisconsin. Her research interests include topics in college student development, vocational psychology, and multicultural issues. Some of her recent publications include an article in the *Journal of Trauma & Dissociation* titled “Nonpathologizing Trauma Interventions in Abnormal Psychology Courses” and several pieces on undergraduate vocational discernment found on vocationmatters.org. [rachel.pickett@cuw.edu]

Teddy Pozo is a PhD student in film and media studies at the University of California–Santa Barbara. Her research interests include video games, digital video, and the politics of gender in digital culture. [teddy_pozo@brown.edu]

Daniel Reynolds is an associate professor in the Department of Film and Media Studies at Emory University. His is the author of *Media in Mind* (2019) and articles in *Game Studies*, *Film Quarterly*, and *Fibreculture*. [daniel.reynolds@emory.edu]

William B. A. Robinson is completing a master’s degree in video game studies at Concordia University in Montreal, Canada. He has written about the aesthetics of play and is currently researching player imagination, user-generated content, and the cultures of motion control at Concordia’s Center for Technoculture, Art, and Games. [wbarobinson@gmail.com]

Guillaume Roux-Girard is an invited professor within the Creation and New Media unit at University of Québec in Abitibi-Témiscamingue (Montréal campus). His current research focuses on the act of listening to video games. [guillaume.roux-girard@uqat.ca]

Judd Ethan Ruggill is a professor and head of the Department of Public and Applied Humanities at the University of Arizona. He is an inveterate (albeit accidental) media archivist. [jruggill@email.arizona.edu]

TreaAndrea M. Russworm is an associate professor of English at the University of Massachusetts, Amherst, and a series editor of *Power Play: Games, Politics, Culture* (2008). She is the author of *Blackness Is Burning: Civil Rights, Popular Culture, and the Problem of Recognition* (2016) and a coeditor of *Gaming Representation: Race, Gender, and Sexuality in Video Games* (2017) and *From Madea to Media Mogul: Theorizing Tyler Perry* (2016). Additionally, her work has been published in *The Velvet Light Trap*, *Frontiers*, and *Black Camera*. She is currently writing a fourth book on race, video games, and the politics of play. [russworm@english.umass.edu]

Taiyoung Ryu is a game designer and game researcher. He has worked on more than fifteen titles across a broad range of platforms, including PC, online, console, and mobile platforms in the United States and Korea. After he earned an MFA at the University of Southern California's Interactive Media Division in 2010, he started a game studio in Korea. Since 2009, he has served as the Asia regional chair for IndieCade. He has also conducted research on microtransaction models and the brain-computer interface. His articles have been published in a number of journals. He has also had a chance to give talks on the subjects at conferences, including GDC and DiGRA. As a journalist for the game industry, he writes articles for newspapers and journals. [taiyoungryu@gmail.com]

Ulf Sandqvist has a PhD in economic history from Umeå University. His main research area relates to the development of computer culture and the game industry, particularly in Sweden and the Nordic region. [ulf.sandqvist@umu.se]

Rita Santoyo Venegas holds a PhD in philosophy from the National Autonomous University of Mexico (UNAM). She wrote a doctoral dissertation in which she analyzes how knowledge is created through the experience of digital play by interacting with digital games. She also explores the foundations of an epistemology that incorporates digital play as experiential knowledge. Her main research interests are ethics, epistemology, philosophy of technology, and game studies. She is a member of the Institute for Design Research (IF) at the University of Applied Sciences Europe. She has presented papers on philosophy and video games in the International Congress of Philosophy in Mexico, Philosophy at Play at the University of Gloucestershire, the Future and Reality of Gaming Conference in Vienna, and GameCamp in Berlin. Her recent publications include "Digital Games and the Collaborative Construction of Knowledge in Paidia" (2017; http://www.paidia.de/digital-games-and-the-collaborative-construction-of-knowledge/) and "Digital Play as Epistemological Experience" in *Philosophies of Play as Praxis*, a forthcoming collection of papers from the Philosophy at Play conference.

[lunazapdos@gmail.com]

Damien B. Schlarb works as an assistant professor (nontenure) of English at Johannes Gutenberg University, Mainz, Germany, where he teaches courses on American literature and culture. He earned his PhD in English from Georgia State University (USA). His research focuses on digital game studies as well as nineteenth-century American literature and culture. He has served as assistant and managing editor, respectively, for the peer-reviewed academic journals *South Atlantic Review* (South Atlantic Modern Language Association) and *Amerikastudien/American Studies* (German Association for American Studies). He is currently preparing to publish a book on Herman Melville and the Old Testament. His new project examines the various forms of work in video games. His work on video games appeared in the edited collection *Playing the Field: Video Games and American Studies* (2019). [dbschlarb@gmail.com]

Stefan Schubert is an assistant professor at the Institute for American Studies at Leipzig University, Germany. In 2018, he received his PhD for a project investigating what he calls “narrative instability” in films, video games, and TV, a study that was published in 2019 as *Narrative Instability: Destabilizing Identities, Realities, and Textualities in Contemporary American Popular Culture*. His wider research interests include popular and visual culture, narrativity, textuality, new media, game studies, gender studies, and post-postmodernism. He has published on questions of narrative and agency in video games such as the *BioShock* series, *Heavy Rain* (2010), and *The Stanley Parable* (2013), and he is a member of the DFG research network “Narrative Liminality and/in the Formation of American Modernities.” [stefan.schubert@uni-leipzig.de]

Kevin Schut is a professor of media and communication, a game development program lead, and an associate dean of the School of the Arts, Media + Culture at Trinity Western University in Langley, British Columbia, Canada. He received his PhD in communication studies at the University of Iowa in 2004. His current research focuses on moral and ethical choice in video games. He is the author of the book *Of Games and God* (2013), and he has published articles and chapters on *No Man’s Sky* (2016) as an imaginary world, LEGO video games, fantasy role-playing games and masculinity, mythology in computer games, Evangelicals and games, and the presentation of history in strategy games. [kevin.schut@twu.ca]

Bobby Schweizer is an assistant professor in the Department of Journalism and Creative Media Industries in the College of Media & Communication at Texas Tech University. He researches the history of theme parks, expressive narrative environments, and game design and play. Bobby is the coauthor of *Newsgames: Journalism at Play* (2010) and coeditor of *Meet Me at the Fair: A World’s Fair Reader* (2014). [schweizer@gatech.edu]

Jean Paul Simon is founder of JPS Public Policy Consulting, a consulting firm that specialized in media and telecom law regulation and strategy. He has held various positions in the telecom industry and worked as a senior scientist at the Institute for Prospective Technological Studies (IPTS), European Commission, Directorate-General JRC. He holds a PhD in philosophy (1975) and is a graduate

(MBA) from the Ecole des Hautes Etudes Commerciales (HEC; MBA in, econometrics, 1971). He has written several books and articles on communications and public policy. He is a frequent speaker on telecommunications and media in Asia, Europe, and the United States. [jpsmultimedia@hotmail.com]

Tim Skelly is the author of the classic Cinematronics vector-based arcade games *Star Hawk* (1978), *Sundance* (1978), *Warrior* (1979), *Rip-Off* (1980), *Star Castle* (1980), and *Armor Attack* (1981). His non–vector games for D. Gottlieb/Mylstar include *Reactor* (1982), *Insector* (1983), and *Screw Loose* (1984). Today, these games are highly prized by collectors. He is an artist and illustrator of several books and magazine articles and is the author of *Shoot the Robot, Then Shoot Mom* (1983), a book of cartoons about classic arcade games. In 1985, as part of a small group of friends and fellow game veterans, he cofounded Incredible Technologies. While there, he was responsible for the visual aspects of all products. He devised and created the primary screen displays for Virtual Worlds' original *BattleTech Center* (1990) and for that project designed the Mad Cat and other Clan OmniMechs. During his time at Incredible Technologies, he took an interest in human-computer interface issues and, drawing on his video game experiences, became active in the HCI community.

After a stint as art director with the SEGA Technical Institute, where he contributed to *Sonic the Hedgehog 2* (1992), he was recruited to be one of the first researchers in the Microsoft User Interface Research Group. While at Microsoft, he often lectured on campus and at conferences on the topic of "seductive interfaces," his research into how user interfaces affect the user. Partially because of that work, he was appointed to the 1996 Panel on Human-Computer Interface Technologies by the U.S. government. He helped found Microsoft's Lifelike Computer Character Conference and has contributed to conferences held by the AAAI, ACM SIGGRAPH, and ACM SIGCHI, presenting tutorials on interface design. He has been a member of the advisory board and a contributor to the *Handbook of Interface Design* (1997), and for a number of years, he was a member of the editorial advisory board for Morgan Kaufmann's series of user interface–related books.

Songsri Soranastaporn, PhD, is an associate professor in English teaching, researcher, and course developer. She teaches English, research methodology, material development, and leadership for information and communication technology and is an expert in English for Specific Purposes. Songsri is the coordinating editor of the "Association News & Notes" column of *Simulation & Gaming Journal* and the cofounder (2008) and the secretary general of the Thai Simulation and Gaming Association (ThaiSim), which invites scholars around the world to join its international conference every year. In addition, she is on the committee of the e-Learning Association of Thailand (e-LAT), which aims to strengthen, promote, and establish e-learning quality and standards (www.e-lat.or.th). She is an editor and reviewer of both Thai and international journals and conferences, such as *Current Topics in Management*, the *Kasetsart Journal* (social sciences) at Kasetsart University, the *Journal of Language and Culture* at Mahidol University, Khonkan University's *International Journal of Humanities and Social Science*, *RMUSTV Research Journal*, *International Conference on Advances in*

Management (ICAM), ThaiSim International Conference, and the International Conference on Computers in Education (ICCE). [songsrisoranastaporn@hotmail.com]

Doug Stark is a PhD student in the English Department at the University of North Carolina, Chapel Hill. Doug's dissertation focuses on the military, industrial, and artistic implementation of play and games in the postwar to midcentury United States. He explores how the archive on cybernetic discourse, behavioral management, and aleatory aesthetics not only reveals an enduring epistemological ground for the computer game, gamification, and experimental new media art as we know them today but also a resource for playful futures not yet taken by the march of history. Otherwise, his research and teaching concern twentieth- and twenty-first-century literature, film, and new media, always with an eye to questions of action, embodiment, mediation, and constructions of the human. He has publications on Afrofuturism, video game literature, and walking simulators in *Extrapolation* (2020), *Playing the Field: Video Games and American Studies* (2019), and the *Journal of Gaming & Virtual Worlds* (2020), respectively. [doge@live.unc.edu]

Jaroslav Švelch is assistant professor of media studies at Charles University, Prague. He has published work on history and theory of computer games, on humor in games and social media, and on playful forms of political participation and activism. His monograph *Gaming the Iron Curtain: How Teenagers and Amateurs in Communist Czechoslovakia Claimed the Medium of Computer Games* (2018) traces the hidden histories of home computing and gaming in the former Soviet bloc. In 2007–08, he was a visiting researcher at MIT's Comparative Media Studies department, and in 2017–19, he was a postdoctoral fellow at the University of Bergen, Norway, working on a project about the history, theory, and reception of monsters in games. He is a cofounder of the Central and Eastern European Game Studies conference. [jsvelch@gmail.com]

Grant Tavinor is a lecturer in philosophy at Lincoln University, New Zealand. He is author of *The Art of Videogames* (2009) and a number of scholarly articles on video games, art, and ethics. [grant.tavinor@lincoln.ac.nz]

Carl Therrien is a professor in games and film studies at Université de Montréal and a member of the LUDOV research group (www.ludov.ca). He has cofounded the History of Games international conference series (www.history-of-games.com). Therrien has published several papers and book chapters on immersion and on video game historiography, for instance, "Grasping the 'French Touch': A Data-Assisted Cultural History of the Adventure Genre" (*Games and Culture*, 2019), "Now You're Playing with Adverts: A Repertoire of Frames for the Historical Study of Marketing Discourse" (*Kinephanos*, 2017), and "Inspecting Video Game Historiography through Critical Lens: Etymology of the First-Person Shooter Genre" (*Game Studies*, 2015). His first book, *The Media Snatcher* (2019), prolongs this work in the context of the Platform Studies series; NEC's PC Engine/TurboGrafx-16 and its CD-ROM extension provides an ideal case study to illustrate methodological issues about the way video game history is constructed and the complex remediation operating between games, cinema, and anime.

[carl.therrien@gmail.com]

Michael Thomasson is one of the most widely respected video game historians in the field today. He currently teaches college-level video game history, design, and graphics courses, and in 2014, *The Guinness Book of World Records* declared that Thomasson had "The Largest Video Game Collection" in the world. For television, Michael conducted research for MTV's video game–related program *Video MODS*. In print, Michael authored *Downright Bizarre Games: Videogames That Crossed the Line* (2016) and has contributed to nearly a dozen texts, including the publication by the inventor of home video games, *Videogames: In the Beginning* (2005) by Ralph H. Baer; *Bill Kunkel's Confessions of the Game Doctor* (2005); both volumes of the *Encyclopedia of Video Games* (2012), and more. His historical columns have been distributed worldwide in newspapers and magazines. Michael has written business plans for several video game vendors and managed almost a dozen game-related retail stores spanning three decades. He has also contributed toward or published dozens of games for several consoles, such as the SEGA CD, ColecoVision, 3DO, Intellivision, Vectrex, CD-i, and several Atari platforms. Michael's classic gaming business also sponsors retrogaming tradeshows and expos across the United States and Canada. Mr. Thomasson resides in New York with his wife, JoAnn, and daughter, Anna. His website is www.GoodDealGames.com. [service@gooddealgames.com]

Staci Tucker was a master's student and teaching fellow of communication and society in the School of Journalism and Communication at the University of Oregon in Eugene. Her research encompassed a range of topics surrounding the intersection of media technologies, identity, and community, including online games. Her projects included an examination of harassment and discrimination based on gender, race, and sexual orientation in massively multiplayer online games as well as an analysis of how data storage structures and online forms impact categories of identity. She has served in various positions as an online manager, programmer, designer, server, and database administrator since 1998. These positions included technology consulting roles in newspapers, media, and education. [stucker@uoregon.edu]

Çetin Tüker is an animator, illustrator, instructor, and architect specializing in 3-D animation, interactive multimedia, and motion graphic design. He completed his undergraduate and graduate education at the METU Department of Architecture in 1992 (BA) and 1996 (MA) and completed his thesis for his doctor of fine arts (DFA) at Mimar Sinan Fine Arts University, Department of Graphic Design, in 2009. Since 1993, he has received several awards for his animations and designs in several fields. He continues his teaching career, which started in 1994, as an associate professor in the Mimar Sinan Fine Arts University, Department of Graphic Design. In 2007, he published his first book, *From Design to Application: 3D Environment Design*, and in 2007 and 2008, his educational DVDs, *Introduction to 3DS Max* (2007) and *Fluid Simulation with GLU 3D* (2008), were released by the Gnomon Workshop. [cetin_tuker@yahoo.com]

Ethan Tussey received his PhD from the University of California–Santa Barbara in 2012. He is an associate professor of film and media at Georgia State

University. His work explores the relationship between the entertainment industry and the digitally empowered public. His book, *The Procrastination Economy: The Big Business of Downtime* (2018), details the economic and social value of mobile device use in the context of the workplace, the commute, the waiting room, and the living room. He has contributed book chapters on ESPN's *Pardon the Interruption*, DC's *SuperHero Girls* action dolls, creative labor, online sports viewing, connected viewing, sports and social media, and crowdfunding to various anthologies. He is also the graduate director of the School of Film, Media & Theatre as well as the coordinating editor of In Media Res and the cofounder of the Atlanta Media Project. He teaches classes on media industries, media theory and history, and digital media. [ethantussey@gmail.com]

John Vanderhoef is an assistant professor of film, television, and media in the Communications Department at California State University, Dominguez Hills. His research interests include indie media, digital labor, and media industries. His book *Passion, Pixels, and Profit: The New Creative Economy of Indie Game Production* explores the influence of romantic individualism and neoliberal ideology on the creative economy of indie game production. He has published works in journals such as *Television and New Media* and *Ada* and in edited collections such as *Production Studies the Sequel!: Cultural Studies of Global Media Industrie*s (2015). He is also an avid narrative game maker and has exhibited digital games at festivals such as Slamdance DIG, WordPlay, and PixelPop Festival. [jvanderhoef@csudh.edu]

Curt Vendel has extensive experience on a professional level in corporate America working as an IT consult for numerous financial banking firms as well as internet infrastructure management. On a personal level, Vendel's interests and experience in the video game industry is multifaceted as a game player, historian, and video game software designer and hardware engineer. Vendel was involved in an advisory role in the infrastructure layout and design of fun.com's *Anarchy On-Line* (2001), a multiuser immersive role-playing game environment. His thorough understanding of the video game industry and knowledge of the current pros and cons involved in the popular MMORPG *EverQuest* (1999) were beneficial in the deployment of this new next-generation gaming environment.

Vendel's true personal passion and devotion lies in the Atari Museum, a network of former Atari employees who have worked together for the preservation of the vast documentation, schematics, technical designs, hardware, and software of the once great video game industry pioneering company. Over the past twenty years, an immense archive has been formed to preserve and present materials that would have surely become refuse in local dumps if not for his devotion and intervention. Vendel has written articles for several video gaming publications; acted extensively as a research reference and source for many books, articles, and software titles; and appeared on several television programs. He also has electronics design knowledge and resurrected a once-thought-lost Atari product called the 7800 High Score Cartridge. Working with a former Atari employee who supplied him with some technical documents and source listing, Vendel was able to recreate this product and market and privately sell it to the classic gaming community.

After many years running his three computer consulting firms, Vendel has retooled his consulting firms toward the video gaming industry and is now involved in the design and creation of numerous hardware and software products for many of the industry's larger and more well-known firms, including Fossil, Logitech, and Atari. He even designed a *Guitar Hero* (2005) game controller for Gene Simmons of Kiss, based on the original AXE guitar. [curt@atarimuseum.com]

Jasper van Vught is an assistant professor in the Department of Media and Culture Studies at Utrecht University. His research focuses on game theory and methodology, game ethics, and game history. He is part of the Centre for the Study of Digital Games and Play, has worked within a large international research project into the classification of games and the dominant experience of violence in entertainment games, and is involved in a project by the Netherlands Institute for Sound and Vision dedicated to the preservation and canonization of Dutch game history. [J.F.vanVught@uu.nl]

Rachel Wagner is an assistant professor of religious studies at Ithaca College. Her work centers on the complex relationship between religion and culture, especially the intersection of technology with religious belief and practice. She has just published a full-length study titled *Godwired: Religon, Ritual, and Virtual Reality* (2011). [rwagner@ithaca.edu]

Matthew Weise is a game designer whose work spans industry and academia. He is the CEO of Empathy Box, a company that specializes in narrative design for games and across media. He was the narrative designer at Harmonix Music Systems on *Fantasia: Music Evolved* (2014), the game design director of the GAMBIT Game Lab at MIT, and a consultant for Warner Bros., Microsoft, Eko, PBS, the National Ballet of Spain, and others on storytelling and game design. His work, both creatively and critically, focuses on transmedia adaptation with an emphasis on the challenges of adapting cinema into video games. Matt has given lectures and workshops on film-to-game adaptation all over the world and has published work on how franchises such as Alien, James Bond, and horror cinema in general are adapted into games. Links to his writing and game design work, including his IGF-nominated *The Snowfield* (2011), can be found at www.matthewweise.com. [matthew.weise@gmail.com]

Karin Wenz is an assistant professor of digital cultures at Maastricht University in the Netherlands at the Faculty of Arts and Social Sciences. Her interests include digital cultures, especially the interrelation between games and art, machinima, and theorycrafting. She also has investigated hacking and death and death rituals in digital games. Her publications include articles on digital literature, game communities, game art, theorycrafting, hacking, and digital death. [k.wenz@maastrichtuniversity.nl]

Thomas Westin is lecturing in game development at the Department of Computer and Systems Sciences, Stockholm University, Sweden. His current research concern is how to support the game industry in making digital games more accessible and inclusive. Thomas teaches design science approaches for user-experience evaluation of games as well as inclusive design approaches of games.

He has also worked with game development and received the Innovation in Audio Award for his first 3-D game at the Independent Games Festival, USA, in 2003. He started the IGDA Game Accessibility SIG in 2003 and has run several game accessibility roundtables at the Game Developers Conference since 2004. He was guest professor at CNAM, Paris, in 2018, where he also assisted to set up the first European Game Accessibility Conference, #GAConfEU. [thomasw@dsv.su.se]

Zach Whalen is an assistant professor in the Department of English, Linguistics, and Communication at the University of Mary Washington, Fredericksburg, Virginia. His continuing research and teaching focuses on new media, with a specific focus on video games, typography, textual theory, and comics. With Laurie N. Taylor, he coedited *Playing the Past: History and Nostalgia in Videogames* (2008). His articles have appeared in *Refractory*, *Game Studies*, *Work and Days*, and *Flow*. He has also contributed chapters to *Music, Sound and Multimedia* (2007) and *The Meaning and Culture of Grand Theft Auto* (2006). His current project, *The Videogame Text*, adapts his 2008 dissertation on typography and textuality in video games into something book shaped. [zach.whalen@gmail.com]

Colin Wheeler is a doctoral candidate in film, media, and theater at Georgia State University. His current areas of scholarship include video games, qualitative data analysis, media industries, and cultural studies. His dissertation focuses on ethnographic methodologies applied to below-the-line labor in Atlanta's creative industries. Graduating from the Savannah College of Art and Design–Atlanta in 2014 with an MFA in animation, Colin practices critical media scholarship while also freelancing in media production. He also works as senior programmer for ASIFA-South, selecting international independent shorts for film festivals. In the future, he hopes to teach theory and design classes that skirt the line between the practical and theoretical. [cwheeler11@student.gsu.edu]

Markus Wiemker studied sociology, philosophy, and psychology with the focus on media and cultural studies at the University of Technology RWTH Aachen in Germany. He has been teaching game design and game studies at various schools and universities in Germany, Austria, and Singapore and also developed game design curricula for institutions in Europe, Southeast Asia, and West Africa. Besides his research interests in the regulation and censorship of digital games, he works as a storyteller and game designer in the areas of toys, games, and gambling. Currently, he is professor of game design at the Media Akademie-Hochschule Stuttgart (mAHS), University of Applied Sciences, Germany. [markus@weimkar.org]

Hanna E. Wirman is an associate professor in games and play design at the IT University of Copenhagen. Her research focuses on marginal and critical ways of playing and making games, including game fandom, serious games, diversity, regional play cultures, and the design and research of animal play. Recently, she has published about play in Hong Kong covering game arcades, escape rooms, Mahjong, game jams, games news, games in special education, and locally developed serious games. [hanna.wirman@gmail.com]

Bryan-Mitchell Young is a PhD candidate in Indiana University's Department of

Communication and Culture, where he is completing his dissertation on local area network parties. His research uses ethnographic methods to examine issues surrounding computer-mediated communication, boundaries between "real" and "virtual," and performances of race and gender. His work combines qualitative research methods with media studies to examine how our identities are shaped by our interactions with technologies and how those technologies are used in ways in which the designers of those technologies did not anticipate. He has maintained a blog at popularculturegaming.com since 2002. [byoung86@ivytech.edu]

Nelson Zagalo is an associate professor at the University of Aveiro-Portugal. He founded the scientific laboratory EngageLab and the Portuguese Society for Videogames Sciences and is now the coordinator of the research group Games and Transmedia at Digimedia/UA. He has more than one hundred peer-reviewed publications in the fields of narrative, games, and creativity. He founded and cochairs the *Journal of Digital Media & Interaction* and has published the books *Interactive Emotions, from Film to Videogames* (2009), *Videogames in Portugal: History, Technology and Art* (2013), and *Creativity in the Digital Age* (2015). [nzagalo@ua.pt]

Xenia Zeiler is a tenure-track professor of South Asian studies at the University of Helsinki, Finland. Her research is situated at the intersection of digital media and culture in India and the worldwide Indian community, with a focus on video game development. She is the author of numerous academic articles and book chapters on mediatized Indian culture and society, including the first ever article on video games and Hinduism. She is cofounder and coeditor in chief of the academic journal *Gamevironments*. [xenia.zeiler@helsinki.fi]

Index

Note: Page numbers in **bold** refer to main entries; page numbers in *italics* indicate photos.

Abbas, Reine, **1–2**
  awards and honors, 2
  Douma Game, 1
  Gaza Shield, 1
  notable games, 1, 566
  SpicaTech Academy founder, 1–2
  Survival Race: Life or Power Plants, 1
  Wixel Studios cofounder, 1, 566
Abstraction, **2–5**
  in arcade games, 3–4
  complexity and, 4
  in early home video games, 4
  future of, 4–5
  of game design compared with boximages, *3*
  impact of technology on, 4
  in independent games, 4
  of player-controlled characters, 3
  of texture maps, 4
Abzû, **5–6**
  dynamic interactive ecosystem, 6
  as experimental game, 6, 319
  gameplay and goal of, 5
  history and development, 5
  Zen motifs, 1174
Accessibility, **6–9**
  Angry Birds and, 34
  audio and one-switch games, 8
  definition of “disability,” 6

  - definition of "game accessibility," 6
  - education for, 8
  - future of, 8
  - game barriers and, 6
  - Game Developers Conference and, 7, 8
  - industry efforts for, 7
  - International Conference on Computers for Handicapped Persons (ICCHP), 8
  - motivations for and benefits of, 6–7
  - multimodal communication of information and, 7
  - player options and, 7
  - research on, 8
  - retrofitting and, 8
  - strategies, methods, and solutions for, 7–8
  - 21st Century Communications and Video Accessibility Act (CVAA), 7
  - Xbox Adaptive Controller, 7, 644

Activision, **9–11**
  - *Alter Ego*, 929
  - Atari 2600 games, 86, 87
  - *Barnstorming*, 76, 405
  - *Battlezone*, 105
  - *Boxing*, 339
  - Bungie and, 126
  - console-based games, 204, 207, 209, 210
  - *DJ Hero*, 464, 860
  - *Enduro*, 829
  - founders of, 9–10
  - games based on films, 342
  - *Grand Prix*, 76
  - *Guitar Hero* series, 11, 190, 209, 210, 219, 418, 675, 816, 952
  - *Hammerfist*, 1054
  - history and founding, 9–10, 76, 223, 224, 713
  - Infocom and, 513
  - *Kaboom!*, 10, 405, 810
  - *Little Computer People*, 430, 929
  - *Mat Hoffman's Pro BMX* series, 563
  - Mattel Intellivision games, 610
  - *Pitfall!*, 10, 76, 204, 378, 405, 701, 761, 921, 1042
  - *River Raid*, 10, 411, 913
  - *Robot Tank*, 258
  - *Skylanders Collection Vault*, 968
  - *Space Shuttle*, 378
  - *Spider-Man* series, 342
  - *Tony Hawk's Pro Skater* series, 11, 207, 849
  - *See also Call of Duty* series; Shaw, Carol; *West and Zampella v. Activision*

Activision Blizzard, **11–12**
  - Activision catalogue, 11
  - Blizzard Entertainment catalogue, 11
  - Bungie and, 12

  Demonware acquired by, 524
  history and founding, 11
  King.com Limited acquired by, 12
  monetization and game design choices, 12
  revenue, 11–12
  Sierra Entertainment and, 919
  Vivendi Games and, 165, 312
  See also Overwatch; World of Warcraft (WoW)
Adams, Douglas, 200, 512, 1110
Adams, Ernest, 368, 369, 462, 502, 523
Adaptation, **12–15**
  challenges of, 13
  definition of, 12
  film adaptations of video games, 13, 14
  financial and power imbalances, 14
  media convergence and, 13, 14
  simulation as distinct from, 12
  video game adaptations, 13, 14
Addiction, **15–16**
  benefits of video game play, 16
  definition of, 15
  internet addiction described in *DSM-5*, 15–16
  signs of addiction to video game play, 15
Adventure, **16–18**, 75, 204, 891
  Adventure II, 17, 478
  Easter egg (hidden screen credit), 17, 86, 277
  first graphical adventure game, 16–17, 1067
  gameplay, 17
  history and development, 16–17, 18–19
  manual, 378
  non-Euclidean space in, 260, 687, 976
  Robinett, Warren, and, 16–17, 86, 277
  third generation of consoles and, 405
Adventure (all-text game), 17, 891, 1033. *See also Colossal Cave Adventure*
Adventure games, **18–21**
  Adventure (all-text game), 17, 891, 1033
  for Atari VCS 2600, 19
  CD-ROM-based games, 20–21
  Colossal Cave Adventure, 18, 328, 421, 511, 591, 1033, 1105, 1110
  definition and characteristics of, 18
  for early home computers, 19
  graphical user interface and, 19–20
  history of, 18–21
  MMORPGs, 21
  Myst, 20–21
  Mystery House, 19
  objectives of, 18
  Rogue, 19

  SCUMM game engine and, 20
  text games, 18–19
  Ultima, 19
  Wander, 18, 1033
  See also Adventure
Advergames, **21–23**
  in Brazil, 118
  definition of, 21–22
  early games for Atari VCS 2600, 22
  history and origins, 22, 23, 24, 472, 748
  newsgames and, 705
  online, 22, 472, 748
  social media and, 472
  in South Africa, 967, 968
  target demographics, 22
Advertising, **23–25**
  celebrity spokespeople, 23
  of early home video games, 23
  in-game advertising, 23–24, 331, 358, 465
  sports games and, 23–24
  See also Advergames
Affordances, **25–28**
  conventions and, 27–28
  definition of, 25, 28
  Gaver, William, on, 26
  Gibson, J. J., on, 25–26, 418
  Norman, Donald, on, 25, 26
  signifiers and, 26–27
Africa, **28–30**
  Adventures of Nyangi, 29, 1202–1203
  game development in Ghana, 29
  game development in Kenya, 29
  game development in South Africa, 28–29
  Leti Games, 29
  Pamoja Mtaani, 28
  popular games and consoles, 28
  Sinc Studios, 29
  Sword of Sygos, 29
  Tawia, Eyram, 29
  See also Egypt; South Africa
Afroes, **30–32**
  awards and honors, 31
  Champchase, 31
  community engagement and distribution, 31
  game development and mobile solutions, 30–31
  gamification solutions, 30
  Haki series, 31, 424
  history and founding, 30

- *JobHunt*, 31, 424
- mission and vision, 31
- Mobiv8ors (mobile motivators), 30
- *Moraba*, 31, 424
- research and analytics, 31
- *See also* Githuku-Shongwe, Anne

AI. *See* Artificial intelligence

Alcorn, Allan "Al," 73–74, 77, 127, 404, 495, 797–798

Alternate reality games, 364
- *Beast*, 775
- definition of, 775
- *I Love Bees*, 614, 643, 1063
- McGonigal, Jane, and, 614
- pervasive games and, 775
- *Publius Enigma*, 775
- ubiquitous games and, 1063
- *Unfiction*, 775

Ambiguity of Play (Sutton-Smith), 395, 785, 786, 787

Angry Birds, **32–34**
- *Angry Birds Halloween, 658*
- drink cans, *33*
- film adaptations of, 848
- franchise crossovers, 34
- gameplay, 32
- Iisalo, Jaakko, and, 253
- innovations of, 33
- microtransactions and, 34
- precedents for, 32–33
- rise of casual games and, 33–34
- success of, 347, 451, 658, 1050

Animal Crossing series, **34–39**
- *Amiibo Festival*, 34, 38
- *Animal Crossing* (2002), 34, 723, 1079
- *Animal Crossing Is Tragic*, 37
- asynchronous multiplay games, 37
- *City Folk*, 34, 38
- eighth generation of consoles and, 409
- fan communities and websites, 37
- gameplay, 35–36
- *Happy Home Designer*, 34, 38, 732
- in-game NES, 37
- *New Horizons*, 34, *35*, 38
- *New Leaf*, 34, 1043
- *Pocket Camp*, 34, 38
- as social simulation games, 36–37
- time in, 1043
- titles, 34
- unlockable games in, 1079

Wild World, 34, 37–38, 711
Animation (computer), **39–41**
in arcade games, 39, 40
in earliest games, 39
game engines and, 40
mathematical visualizations, 40
parallax scrolling and, 39–40
three-dimensional graphics, 40
two-dimensional graphics, 39–40
Animation (hand-drawn), **41–43**
anime-styled graphics, 42
in art games, 42
cartoon-styled graphics, 41–42
computer-emulated cel-shaded animation, 42
in earliest games, 41
in laserdisc arcade games, 41
rotoscoped characters, 41
Apocalypse, **43–45**
in *Days Gone*, 218
definition of, 43
dualisms of, 43
in *Left Behind: Eternal Forces*, 44
procedural rhetoric of, 43–44
video games compared to, 43–44
See also Dystopian games; *Fallout* series
Apple Bandai Pippin, **45–46**
development and release of, 45
game library, 45
price, 45
Apps (applications), **46–47**
definition of, 46
GeForce Now streaming, 46–47
internet connectivity and, 46
PlayStation Now streaming service, 47
software as a service (SaaS), 46
user-control configurations for, 46
Arakawa, Minoru, **47–48**
Blue Lava Wireless founder, 48
Donkey Kong development and, 47–48
early years and education, 47
Mario development and, 600
NES development and, 48, 711–712
Nintendo of America (NOA) founder, 47
Radar Scope and, 47
resignation from NOA, 48
Tetris acquired by, 48
Tetris Online, Inc. cofounder, 48
Arcade cabinet art, **48–49**

  - bezel, 48–49
  - *Computer Space* cabinet, 48
  - control panel overlay (CPO), 48
  - definition of, 48
  - forums, communities, and museums, 49
  - *House of Dead* series cabinets, 48
  - marquee, 48–49
  - *Pac-Man* cabinet, 49
  - purpose of, 48–49
  - side artwork, 48
  - *Tempest* cabinet, 1027

- Arcade games, **49–55**
  - ball-and-paddle games, 49–50
  - *Battlezone*, 51
  - Bushnell, Nolan, and, 49
  - cabinet designs, 51, 52
  - collectors of, 55
  - *Computer Space*, 49
  - crash of 1983, 52
  - decline of the arcade, 54–55
  - DECO Cassette System and, 51, 52
  - *Defender*, 51
  - driving and racing games, 50, 51
  - early history of, 49–50
  - early twenty-first century, 55
  - *I, Robot*, 52
  - industry expansion and innovation, 50–51
  - Japanese Arcade Machine Manufacturers' Association (JAMMA), 53
  - laserdisc games, 52
  - 1980s, 51–53
  - 1990s, 53–55
  - 1970s, 49–51
  - *Pac-Man*, 51
  - *PONG*, 49–50
  - redemption games and, 54
  - rhythm and dance games, 54
  - *Rip Off*, 51
  - ROM and, 50
  - sequels, variants, and series games, 51, 52, 53
  - *Space Invaders*, 51
  - specialized interfaces, 53–54
  - sports games, 50, 53–54
  - suicide batteries and, 53
  - *Super Bug*, 51
  - three-dimensional graphics, 52, 54
  - *Trivia*, 50–51
- Arcades, **55–59**
  - arcade machines of the 1990s, *56*

  in Asia, 58
  boom and bust cycles, 57
  decline of, 58
  definition of, 55
  electric coin-operated pinball machines, 57
  Gunblade NY: Special Air Assault Force, *56*
  modern sites and relevance of, 58
  multiplayer gaming and tournaments in, 57–58
  penny arcades, 56–57, 58
  pinball parlors, *56*
  shopping arcades, 55–56
  video game arcades, 57
Archives, **59–61**
  academic archives, 59
  archivists, 60
  collection practices, 59–60
  commercial archives, 59
  definition of, 59
  emulation technology and, 60–61
  exhibition practices, 60
  functions of, 60, 61
  hardware and software challenges, 60
  material contents, 60–61
  organization practices, 60
  personal archives, 59
  preservation practices, 60
  public archives, 59
Argentina, **61–63**
  ALFAS-Argentina, 62–63
  Argentine Exhibition of Videogames (EXPO EVA), 61
  art games, 62
  Asociación Argentina de Videojuegos (ADVA), 61
  Bermergui, Daniel, 62
  community of independent developers, 62
  DOGOS, 62
  Element: Space, 62
  Ethereal, 62
  Fundación Argentina de Videojuegos (FUNDAV), 61–62
  game research and education, 62–63
  gamers, developers, and designers, 62
  Juego de Truco, 62
  Master of Orion: Conquer the Stars, 62
  Nievas, Naomi Marcela “Sharara,” 62
  Scrunff, 62
  Storyteller, 62
  video game institutions, 61–62
Aristotle
  biomechanics and, 111

  enthymeme, 809
  on games, 390
  poetics, 565
  procedural rhetoric and, 809
  rhetorical tradition relied on by game scholars, 858–859
  virtue ethics, 661, 809
Art, **64–65**
  artists as game designers, 64
  debates on video games as art, 64
  influence of Japanese art on designers, 64
  influence of visual art on designers, 64
  video games as subject of art, 65
Art, video games as, **65–68**
  definition of "art," 65
  digital technology and, 67–68
  experimental games and, 66
  interactive art and, 67
  multiple endings and, 67
  narrative art and, 66–67
  player control and, 67
  time-based art and, 66
  video games as subject of art, 66
  video games used to produce art, 66
  visual elements of video games, 65–66
Artificial intelligence (AI), **68–70**
  in *Centipede*, 100
  cooperative gameplay and, 219
  Deep Blue, 69
  definition of AI in video games, 68
  Desktop Tower Defense and, 69
  fears of, 273
  first video game to use AI, 100
  history of, 68–69
  implementation and "cheats," 69–70
  learning and, 69
  Left 4 Dead and, 69
  in *Marathon 2: Durandal*, 125
  Nintendogs and, 69
  Pac-Man and, 68
  path-finding and, 69
  personality and, 69
  problems solved by video game AI, 69
  in racing games, 829
  in *Sim* series, 926
  turn-based opponents and, 69
Asheron's Call, **70–71**
  Asheron's Call 2: Fallen Kings, 71
  awards, 71

- closure of, 70
- gameplay, 70
- history and development, 70
- Kurlancheek, Jesse, and, 71
- one of first “big three” MMORPGs, 70, 471, 620
- “patron” and “vassal” system, 70–71
- PvP (player versus player) combat, 70
- reception, 70

Association for UK Interactive Entertainment (UKIE), **71–72**
- activities and services, 72
- goal of, 72
- history and founding, 71
- membership, 72
- voluntary video game self-rating system, 72

Atari, **73–77**
- Atari, Inc., 76
- *Atari Anthology*, 76
- Atari Corporation, 76
- Atari Games Inc., 76
- Atari SA, 76
- crash of 1983, 76
- as division of Hasbro, 76
- early notable arcade games, 75
- founders and notable early employees, 73–74
- history of, 73–76
- ownership and management changes, 75–76
- *PONG*, 73, 74
- purchased by Warner Communications, 75–76, 128
- scholarship on, 76–77
- subsidiary of Infogrames, 76

Atari, Inc. v. North American Philips Consumer Electronics Corp., **77–78**
- background and case details, 77–78
- decision, 78
- impact of, 77

Atari 5200, **78–79**
- controllers, 78–79
- hardware, 78
- *Moon Patrol* for, 462
- naming of, 78
- price, 79
- reception and sales, 79
- release of, 75, 78
- second-generation console, 78, 405

Atari Flashback series, 17, 87, 226, 478

Atari Jaguar, **79–81**
- bit count debate, 80
- CD-ROM peripheral, 80–81
- Coin-Op Jaguar (COJAG), 81

  Cybermorph packaged with, 80
  "Do the Math" slogan, 80
  fifth-generation console, 406, 470, 508
  game library, 80
  hardware, 79–80, 406
  IBM partnership, 79–80
  JagLink peripheral, 81
  Jaguar CD game library, 80–81
  launch, 80, 81
  Midwest Gaming Classic and, 650
  open platform and homebrew activity, 81, 478
  price, 79
  processors, 80, 406
  Rayman, 80, 1065
  reception, budget, and sales, 45, 76, 80, 81, 207
  shelved peripherals, 81
  Virtual Light Machine (for Jaguar CD), 80–81
Atari Lynx, **81–83**
  ambidextrous layout, 82
  features, 82, 448
  game library, 83
  history and development, 81–82
  homebrew activity, 478
  in International Center for the History of Electronic Games collection, 521
  Lynx II, 83
  "Lynx-Up" multiplayer feature, 82
  Nintendo Game Boy compared with, 82, 83, 448, 449, 719
  price, 82
  Qix, 821
  reception and sales, 76
  technical specifications, 82
  Todd's Adventure in Slime World, 82
Atari 7800 ProSystem, **83–85**
  arcade conversions for, 205
  backward compatibility of, 83–84, 205
  console design, 84
  development kit, 476
  features, 84
  game library, 189
  history and development, 83
  homebrew activity, 476
  joypad-style controller, 83, 542
  naming of, 83–84
  postponed release, 84
  price, 84
  reception and sales, 84
  technical specifications, 83–84
  third-generation console, 405, 469

Atari VCS 2600, **85–88**
  Activision games for, 10, 86
  Activision's founding and, 86
  adjustable difficulty levels, 462
  Adventure, 16–17, 86, 277
  adventure games for, 19, 20
  advergames for, 22
  Atari 5200 and, 78, 79
  Atari Flashback series and, 87
  bank switching, 85–86
  board game adaptations for, 116
  cartridge-based system, 102, 145–146, 204, 448, 467, 475
  cartridges packaged with, 85, 189
  Coleco games for, 185
  ColecoVision Expansion Module for, 185, 187
  collectors and, 189
  color and graphics, 4, 439
  Combat, 85, 189
  controversial titles, 154, 663, 714
  Donkey Kong, 185, 205, 709
  E.T.: The Extra-Terrestrial, 86, 204, 521, 711
  game manuals for, 378
  games adapted from comics for, 194–195
  games programmed by individual programmers, 756
  history and development, 85, 128, 203–204
  homebrew activity, 87, 459, 475–477, 478
  in Indonesia, 503
  joystick, *73*, 85, 417, 518, 542
  KLAX, 475
  legacy of, 75
  longest commercially available console, 85
  Mattel Intellivision compared with, 204, 610
  in the Middle East, 647
  in New Zealand, 699, 700, 701
  NFL Football, 352
  Pac-Man, 86, 204, 711
  peripherals, 86
  price, 85
  RealSports Soccer, 335
  River Raid banned in Germany, 411
  second-generation console, 404, 506
  sound channels, 717
  Space Invaders, 85
  Stellar Track, 595
  Tank!, 85
  2600jr, 86
  Wizard, 226
  Zaxxon, 185

  See also CVC GameLine Master Module
AtariVCS (Ataribox), 87
Audio (dynamic, interactive, and adaptive), **88–89**
  adaptive audio, defined, 88
  dynamic audio, defined, 88
  feedback-driven (feedforward) sound and, 89
  informational sound and, 89
  interactive audio, defined, 88
  in *The Legend of Zelda: Ocarina of Time*, 89
  in *The Legend of Zelda: Phantom Compass*, 88–89
  repetitive sounds and, 89
Augmented reality (AR), **90–91**
  in *Chocapic 3D*, 167
  controversy regarding, 90
  definition of, 90
  dimensionality and, 257, 261
  in *levelHead*, 90, 319
  mobile gaming devices and, 90, 1050
  in *Pokémon GO*, 90, *91*, 261, 502, 775, 790–791
  research centers in Turkey, 1056–1057
  visual space and, 977
  See also HoloLens
Australia, **91–93**
  game development companies, 92
  gaming and industry statistics, 91–92
  regulation of video games, 92
Avatars, **93–95**
  customization of, 93–94
  definition of, 93
  early use of the word in digital culture, 93
  influence of on player identity, 94
  in MMORPGs, 93–94
  player characters and, 93
  in *The Sims* series, 93
  in single-player games, 94
AY-3-8500 chip, **95–96**
  built-in games and game options, 95, 102, 203, 222
  Coleco Telstar and, 95–96, 185
  crash of 1977, 203, 222, 223, 467
  history and development, 95, 102
  impact and influence of, 96, 98, 102, 415, 1073

Baer, Ralph H., **97–99**
  awards, honors, and museum exhibits, 99
  AY-3-8500 chip and, 95–96, 98
  Bally/Midway and, 98
  Brown Box prototype, 95, 97–98, 99, 203, 348, 373, 439, 466, 495, 584, 1025
  Coleco's Telstar system and, 96, 98

  early years and education, 97
  electronic toys and games, 98
  influence and legacy, 97
  light gun interface, 97–98, 518
  Magnavox Odyssey, 97, 98, 99, 584–585
  notable technological “firsts,” 99
  ping-pong game, 74, 989, 1076
  R. H. Baer Consultants, 98
  at Sanders Associates, 97–98
  Simon, 98, 859
  simulators developed by, 651
  Talkin’ Tools toys, 98
  Videogames: In the Beginning, 98
Bailey, Dona, **100–101**
  at Atari, 100
  Centipede, 75, 100
  on mini-trackball used in *Centipede*, 100
  at Videa, 100
Ball-and-paddle games, **101–102**
  Breakout, 101
  built into AY-3-8500 chip, 95, 102, 203, 222
  definition of, 101
  generations of technology and, 102
  Magnavox Odyssey, 101, 102
  PONG, 101–102
  retrogaming and, 102
  significance of in video game history, 101
Bally, **102–104**
  Bally Professional Arcade, 103
  first electromechanical slot machine, 102
  history and founding, 57, 102
  Midway Manufacturing and, 102–103, 649
  restructuring and management changes, 103
Barbie Fashion Designer, 421, 422
Barnstorming, 76, 405
Battlezone, **104–105**
  Army Battlezone (Bradley Trainer), 104–105, 280–281, 651
  cabinet, 104, 461, 517
  first-person perspective, 104, 915, 916
  game space, 104
  gameplay, 104
  in history of FPSs, 349, 350
  maps, 595
  off-screen space, 104, 976
  significance and legacy, 51, 104, 105, 1087
  three-dimensional computation, 104, 442, 469, 1087, 1170
  updated versions and VR iterations, 105
  vector graphic technology, 40, 104, 258, 349, 442, 467, 1170

BBSs. *See* Bulletin board systems
Beat Saber, 236, 238, 310, 420, 483, 746, 1124
"Beating" a game, **105–109**
  "beating" other players, 107–108
  "beating" the computer, 106
  cultural context of, 108
  definition of, 105
  Easter eggs and, 106
  feedback system and, 105–106
  first-person shooting games, 106
  greed play and, 107–108
  grief play and, 107
  kill stealing and, 108
  narrative games, 106
  ninja looting and, 108
  online gaming networks and, 108
  speedrunning and, 107
  temporal and spatial reward structures, 107
  "winning" compared with, 105
Beatmania, 54, 109–110, 553–554, 675, 860
Bemani, **109–111**
  Beatmania, 54, 109–110, 675, 860
  composers at, 676
  Dance Rush, 110
  DrumMania, 54, 110, 418, 554
  GuitarFreaks, 54, 110, 418, 554, 675, 860
  interfaces used by, 54
  Keyboardmania, 110
  naming of, 110, 554
  smartphone game versions, 110
  See also Dance Dance Revolution; Konami
Biomechanics, **111–114**
  Dance Dance Revolution and, 113
  definition of, 111
  gestural interfaces and, 113
  history of, 111
  moving images and, 111–112
  video games and, 112–113
BioShock series, **114–116**
  BioShock (2007), 114–115, 210, 271, 272, 276, 664, 1082
  BioShock Infinite, 114, 115, *115*, 274, 275, 634–635
  BioShock 2, 114, 115
  as dystopian games, 271, 272, 274
  Easter eggs in, 278
  ethical dilemmas in, 664
  history and development, 114
  in history of console-based games, 210
  influence of *Atlas Shrugged* (Rand) on, 114

- metatextuality and, 634–635
- plot, 114–115
- settings, 114, *115*
- *System Shock 2* and, 114, 278
- Unreal Engine 3 and, 1082

Blu-ray disc games. *See* DVD and Blu-ray disc games

Board games, **116–117**
- based on video games, 116–117
- components of, 116
- history of, 116
- hybrid games, 116
- video game adaptations of, 116

Bogost, Ian, 77, 284, 599, 663, 777, 783, 784, 828, 936
- on asynchronous multiplay games, 36–37
- *Cow Clicker*, 220–221, 331, 499
- on exploitationware, 395
- *Fatworld*, 458
- on procedural rhetoric, 24, 43–44, 809–810, 826
- on unit operations, 1070, 1072

Boss keys, **117–118**
- decline in use of, 118
- definition of, 117
- efficacy of, 117–118
- game manuals on, 118
- origins of, 117
- popular games that use, 117

Brazil, **118–121**
- Agência Nacional do Cinema (ANCINE), 119
- *Árida: Backland's Awakening*, 119
- BIG (Brazil's Independent Games) Festival, 119
- BNDES report on, 118–119
- *Distortions*, 119
- *Elderand*, 119
- gaming and industry statistics, 118–119
- gaming legislation and tax incentives, 120
- notable and award-winning games, 119–120
- professional education, 120
- *Toren*, 120

Brown Box (prototype for first video game console), 95, 97–98, 99, 203, 373, 439, 466, 495, 584, 1025

Brown v. Entertainment Merchants Association, **121–122**
- background and case details, 121
- impact of, 121
- opinion and dissents, 121–122

Budra, Paul, 106

Bulletin board systems (BBSs), **122–124**
- ANSI art, 123
- BBS Meets or Get Togethers, 122

  BBS software in home computers, 123
  custom character sets, 123
  door games, 124, 911
  earliest BBSs, 122
  in history of shareware games, 911
  in history of social media, 941, 942
  in history of video games, 468
  leet (l33t) slang, 123–124
  lists of video games distributed via, 546, 1117–1118
  modem technology and, 122, 197
  multiuser domains compared with, 670
  origins of the term, 122
  print publications devoted to, 123
  raids on BBSs, 123
  special interest boards, 123
  system operators (sysops), 122
Bungie, **124–126**
  acquired by Microsoft, 125–126, 643, 1159
  Activision Blizzard and, 12
  history and founding, 124–125
  Jones, Jason, and, 125
  Marathon series, 125, 261, 643
  Myth: The Fallen Lords, 125
  Seropian, Alex, and, 124–125
  split from Microsoft, 876, 1160
  See also Destiny series; *Halo* series
Bushnell, Brent, 1052
Bushnell, Nolan, **126–129**
  Atari cofounder, 127, 202, 466
  Atari VCS 2600 and, 128
  awards and honors, 129
  Catalyst Technologies founder, 129
  Chuck E. Cheese founder, 128
  Computer Space, 49, 127, 202, 348, 361, 439, 440, 466, 495, 981
  departure from Atari, 128
  early years and education, 126–127
  impact and legacy of, 126
  Kee Games cofounder, 127
  PONG and, 127, 128, 373, 466–467
  sale of Atari to Warner Communications, 128
  Syzygy Engineering cofounder, 127

Caillois, Roger, **130–132**
  on categorization of games, 131–132, 394
  on “the contagion of reality,” 432
  on definition of “play,” 130, 785, 786
  game ontology and, 749
  gamification and, 395

  Man, Play, and Games, 130–132, 217, 392
  on *paidia* and *ludus*, 131, 785
  on rules and conventions, 217
Call of Duty series, **132–137**
  actor voices and performances, 134–135
  Call of Duty (2003), 132–133, 134, 182, 595, 705
  Call of Duty: Advanced Warfare, 134, 274
  Call of Duty: Black Ops, 133–134, 1115
  Call of Duty: Black Ops 4, 136, 137
  Call of Duty: Black Ops II, 134
  Call of Duty: Black Ops III, 133, 134, 135–136
  Call of Duty: Infinite Warfare, 134, 135, 136, 645
  Call of Duty: Modern Warfare 2, 134, 136–137, 618, 762, 1139
  Call of Duty: Modern Warfare 3, 135, 501, 1140
  Call of Duty: Modern Warfare Remastered, 136
  Call of Duty: World at War, 133, 134, 135, 1154
  Call of Duty: WWII, 133, 134, 163, 1154
  Call of Duty 4: Modern Warfare, 11, 210
  Call of Duty League, 12, 760
  Call of Duty 2: Big Red One, 133, 643, 643
  cheating in, 162
  early history and development, 136
  gameplay, 132–133
  historical realism in, 132, 134, 1153, 1154
  Infinity Ward and, 136–137
  litigation, 136–137
  maps, 135, 595
  representational time and space of play, 133–134
Canada, **137–138**
  B.C.'s Quest for Tires, 137
  Bioware, 138
  EA Canada, 137–138
  Evolution, 137
  Personal Computer Museum (Brantford, Ontario), 138
  Ubisoft Montreal, 138
Candy Crush Saga, **138–140**, 527, 1019
  freemium model of, 139, 1051
  gameplay, 139
  on Google Play, 434
  history of, 138–139
  in history of casual games, 603
  social network game (SNG) progression model of, 139
  spin-offs, 139
  user retention, 358
Capcom, **140–141**
  Breath of Fire franchise, 1012
  Chip 'n Dale Rescue Rangers, 717
  Commando, 718

  - CP System 1, 52
  - *Devil May Cry*, 209
  - *DuckTales*, 174, 717
  - fighting game events and, 140
  - game guide licensing, 375
  - *Ghosts 'n Goblins*, 140, 718
  - history and founding, 140
  - *Marvel v. Capcom* series, 140, 208, 338, 340, 548, 561
  - *Mega Man* series, 205, 532, 718, 1012
  - NES and, 717, 718, 1152
  - *1942*, 1152
  - *Okami*, 64
  - professional gaming and, 140–141
  - run-and-gun franchises, 140
  - shooting games, 140
  - SNES and, 140, 1012
  - suicide batteries used by, 53, 1008
  - *Tatsunoko v. Capcom*, 337
  - *Viewtiful Joe*, 195
  - *See also Resident Evil* series; *Street Fighter II*
- *Capcom USA v. Data East*, **141–142**
  - background and case details, 141–142
  - decision, 141–142
  - impact of, 142
- Careers, **142–144**
  - artist, 143
  - esports, 144
  - game designer, 142–143
  - game reviewer, 144
  - game tester, 143
  - hardware engineer, 143–144
  - marketing and public relations specialist, 143
  - professional experience and, 144
  - at smaller companies, 144
  - software programmer, 143
- Carmack, John, 263, 492, 493–494, 741–743, 745
- Cartridges, **144–147**
  - for Atari VCS 2600, 145–146
  - CD-ROMs compared with, 146–147
  - definition of, 145
  - early history of, 145
  - for Fairchild Channel F, 145
  - impact on industry of, 145–146, 147
  - for Magnavox Odyssey, 145
  - for NES, 145, 146
  - for Nintendo 64, 146
  - for Nintendo Switch, 147
  - patent by Alpex Computer Corporation, 145

- replaced by CD-ROM technology, 146
- for SEGA Mega Drive, 146
- for SNES, 146, 147

Casual games, **147–149**
- advergames as, 22
- *Angry Birds*, 33–34
- antipathy toward, 147
- *Bejeweled*, 221, 603
- by Big Fish Games, 148
- business models of, 148
- characteristics of, 147
- in Chile, 165
- *FarmVille*, 330
- Flash games, 148
- *Flower*, 887
- game culture of, 147–148
- gender and, 147–148, 332, 402, 403, 603
- in Germany, 414
- on Google Play, 434
- green games as, 302
- handheld games as, 451
- history of, 148
- IGDA “2008–2009 Casual Games White Paper,” 147–148
- in India, 501
- in Jordan, 535
- mobile games as, 659
- by Oberon Media, 534
- online distribution of, 148
- original concept and labeling of, 147
- by Pogo.com, 148
- *PONG*, 797
- by PopCap Games, 148, 221, 603
- reception theory and, 833, 834
- rise of, 33–34
- role-playing games (RPGs) as, 872
- in Russia, 881, 883
- *The Sims*, 332
- for smartphones and social networking sites, 148
- in South Africa, 970
- in Syria, 1023
- text adventure games as, 1034
- touchscreen games as, 1046
- for video game consoles, 148
- web-based games as, 472, 603
- *Wii Fit* and, 211
- *See also Candy Crush Saga*

Cathode-ray tube amusement device. *See* Patent #2,455,992

CCP Games, 313, 314, 491, 492, 745–746

CD-ROM-based games, **149–151**
  animated cutscenes in, 150–151
  audio tracks, 150
  Commodore CDTV and, 150
  compact disc development and, 149
  compact disc systems, 149–150
  extended game strategy of, 150–151
  FM Towns (Fujitsu) and, 149–150
  full-motion video (FMV), 150, 151
  interactive movies in, 151
  Multimedia PC (MPC) format guideline, 150
  NEC PC-Engine/Turbografx16 and, 149
  PC Engine Duo (first console with built-in CD-ROM drive), 150
  Philips CD-i and, 150
  SEGA Genesis/SEGA Mega Drive and, 149
  SEGA Saturn and, 150
  Sony PlayStation and, 150
  3DO Interactive Multiplayer and, 150
Censorship, **152–160**
  conditions of rating systems, 153
  criticism of game regulation, 157–158
  definition of, 152
  forms of regulation and classification, 152–153
  online rating joint ventures and regulation, 156–157
  postcensorship, 153
  precensorship, 152
  private regulation and, 153
  ratings systems, 154–156
  recent changes in criteria for, 158–159
  rise of video game censorship, 154
  self-censorship, 153
  state-controlled classification and, 153
Centipede, 51, 75, 100, 205, 523, 915, 1117
Channel F. *See* Fairchild/Zircon Channel F
Cheat codes, 160, 161, 179, 666, 879, 1105
Cheating, **160–162**
  aimbots, 160
  code alteration, 160
  common reasons for, 161
  definition of, 160
  deludic play and, 248
  FAQs, 161
  gold farming, 161
  industry responses to, 161–162
  in multiplayer games, 161–162
  players' views on, 162
  use of information external to a video game, 160
  walkthroughs, 160, 161, 162

- *See also* Cheat codes; Walkthroughs

Checkpoints, **162–164**
- in *Call of Duty: WWII*, 163
- in *Dark Souls*, 162–164
- definition and purpose of, 162
- in *Donkey Kong*, 162
- in *Dragon's Lair*, 163
- in home console games, 163
- in *Out Run*, 163
- in racing games, 163

Chen, Jenova, **164–165**
- contemplative games, 214
- early years and education, 164
- experimental games, 319
- museum exhibits featuring games of, 164–165
- silent cinema and, 922
- thatgamecompany cofounder, 214, 1037
- Zen gaming and, 1173
- *See also Cloud; flOw; Flower; Journey*

Chen, Mark, 432

Chile, **165–169**
- ACE Team, 165–166, 168
- AmnesiaGames, 166–167
- AOne Games, 168
- Atakama Labs (later DeNA Chile), 166
- BURA, 166
- Crea tu Juego competition, 167
- Gamaga, 167
- Giant Monkey Robot, 168
- IguanaBee, 167
- institutional and developmental ecosystem support, 168–169
- *Long Gone Days*, 166
- *Massive Warfare: Aftermath*, 168
- *Negro Matapacos*, 167
- Nemoris Games, 167
- Niebla Games, 168
- *Omen of Sorrow*, 168
- Psycho World, 166
- TinyBytes, 167–168
- USM Games, 167
- Videogames Chile A.G. (VGC), 169
- Wanako Games, 165–166, 168
- *Zenozoik*, 165–166, 168

China, **169–172**
- censorship and state control of gaming, 153, 170–171
- game development, 171
- game piracy, 169–170, 171, 782–783
- gamer and gaming statistics, 169, 170

  mobile gaming, 170
Chip. *See* Integrated circuit (IC)
Chop Suey, 264–265
Chronicles of Riddick: Escape from Butcher Bay, 13, 342, 998, 1019
Cinematics. *See* Cutscenes
Cinematronics, **172–174**, 1089, 1090, 1091–1092
  Cravens, Bill, and, 1089
  Embargo, 172
  Flipper Ball, 172
  games for GCE/Milton Bradley Vectrex, 400
  history and founding, 172
  "kit" games, 172, 173
  litigation, 173
  Pierce, Jim, and, 172, 173
  Rip Off, 51, 173, 219, 400, 1087, 1088
  Rosenthal, Larry, and, 172–173, 1089
  Skelly, Tim, and, 172, 173, 219
  Space Wars, 104, 172, 348, 400, 541, 981, 1086, 1088, 1090
  Starhawk, 51, 172–173, 831, 1086, 1088
  Stroud, Tom "Papa," and, 172, 173
  Sundance, 173, 1086–1087
  Tail Gunner, 173, 1087, 1091–1092
  vector games, 981, 1086–1087, 1088
  War of the Worlds, 173
  Warrior, 51, 173, 339, 467, 1087, 1092
  See also Dragon's Lair; Vectorbeam
City of Mesquite v. Aladdin's Castle, Inc., **174–175**
  background and case details, 174
  decision, 174
  impact of, 174–175
Civic engagement, **175–177**
  communities outside of in-game activity, 176
  community and social issues addressed through games, 176
  in-game civic engagement, 175–176
  volunteer work and fundraising, 176–177
Civilization series
  anti-utopia and, 274
  Civilization (1991), 274, 615–616, 641
  Civilization: Beyond Earth, 616
  Civilization: Revolution, 616
  Civilization III, 312, 641
  Civilization IV, 616
  Civilization V, 488, 616, 641, 753
  Civilization VI, 616
  4X subgenre of strategy games, 1002
  god games and, 431
  in history of simulation games, 932
  in history of strategy games, 1000, 1002, 1003

  Meier, Sid, and, 615–616
  procedural generation in, 806
  sound, 961
Cloud, 164, 214
Co-creativity, **177–179**
  casual games and, 178
  definition of, 177
  game development and, 177–178
  game genres and, 178
  game modifications and, 177–178, 753
  history of the term in video game studies, 177
  playbour (free player labor) and, 177–178
  player communities and, 178
  similar terms and concepts, 178
Codemasters, **179–180**
  BMX Simulator, 179
  Codemasters Evo, 180
  Dance Factory, 860
  Dizzy series, 795
  Evolution Studios acquired by, 180
  history and founding, 179
  Leisure Suit Larry series, 179–180
  ONRUSH, 180
  Operation Flashpoint: Dragon Rising, 180
  Overlord, 180
  The Realm Online, 919
Cognition, **180–185**
  causal and counterfactual mechanisms, 180, 182–184
  executive system and, 181, 183
  expressions of, 183–184
  limbic (emotional) system and, 181, 183
  MMORPGs and, 183
  neurobiology of video game play, 181–182
  puzzle games and, 184
  strategy games and, 184
  in video game play and design, 182–183
Cohen, Scott, 76–77
Coleco, **185–186**
  ADAM home computer, 185–186, 187
  bankruptcy and acquisition by Hasbro, 186, 187
  Cabbage Patch Kids, 186, 187
  Canadian Eagle Toys purchased by, 186
  crash of 1977, 185, 222
  first company to order AY-3-8500 chip, 96, 222
  history and founding, 185
  LED-based handheld game units, 185, 186
  Telstar Arcade, 98, 185, 186, 417, 541
  Telstar game consoles, 75, 96, 98, 185, 186, 404, 467

  See also ColecoVision
ColecoVision, **186–188**
  Activision games for, 10
  comic strip-inspired games for, 194
  controller peripherals, 187
  Donkey Kong for, 185, 205
  expansion module for ADAM home computer, 185–186, 187
  expansion module for VCS 2600 cartridges, 79, 185, 187, 204
  hardware and technical specifications, 187
  "Plays like the real arcade game" slogan, 187
  release of, 185, 186
  second-generation console, 186, 405
  Super Action Baseball for, 187
  Super Action Football for, 352
Collecting video games, **188–191**
  accessories and peripherals, 190–191
  homebrew games, 191
  professional and public collections, 191
  record prices and notable sales, 190
  traditional collecting compared with, 188
  value and collectability, 188–190
  Video Arcade Preservation Society (VAPS), 191
Colombia, **192–194**
  arcades, 192
  Colombia 4.0 summit, 192
  Colombia Videogames Summit (COVS), 193
  Colombian Video Games Association (COVA), 192–193
  Immersion Games, 192
  influences on video game industry, 192
  Jam City (Bogotá), 193
  Unity (Pereira), 193
  Unity User Expo (Bogotá), 193
  video game studios, 193–194
Colossal Cave Adventure, 18, 328, 421, 511, 591, 1033, 1105, 1110. *See also Adventure* (all-text game)
Comics, **194–195**
  aesthetics and gameplay mechanics based on, 195
  comic book adaptations of video games, 194–195
  early video game adaptations from comics, 194
  video game adaptations from European comics, 194
Computer games, **195–198**
  converging technologies and, 197–198
  definition of, 195–196
  early home computers and, 196–197
  mainframe games, 196
  modem technology and, 197
  storage media and, 197
  use of the term in scholarship, 198

Computer Games Magazine, **198–200**
  cancellation of print publication, 199
  focus and features, 198–199
  international scope and distribution, 199
  layout, 199
  Massive Magazine and, 199
  ownership and name changes, 199
  years of publication, 198, 199
Computer Gaming World, **200–201**, 537
  first issue, 200
  journalistic variety in, 200–201
  ownership and name changes, 201
  scope and features, 200–201
  walkthroughs in, 1132
  years of publication, 199, 200
Computer Space, **201–203**
  Bushnell, Nolan, and, 49, 73, 127, 202, 348, 361
  cabinet, 48, 1025
  Dabney, Ted, and, 202, 466, 981
  in films, 202, 844
  first commercially sold video game, 201, 348, 466, 981
  Galaxy Game and, 361, 589
  gameplay, 202
  history and development, 49, 57, 73, 127, 201–202, 495
  in history of arcades, 57
  in history of graphics, 439, 440
  in history of shooting games, 916
  at museums, exhibits, and conventions, 202–203, 672, 1101, 1116
  Nutting Associates and, 49, 57, 73
  "patch" animation graphics, 439, 440
  reception and sales, 202, 495
  space battles in, 1171
  Spacewar! and, 49, 73, 202, 348, 466, 589, 981
Console-based games, **203–213**
  action-platform games, 205
  for Atari VCS 2600, 203–205
  cartridge-based systems, 203–204, 205, 208
  for ColecoVision, 204
  crash of 1983, 204–205
  crash of 1977, 203
  definition of, 203
  for Fairchild Channel F, 203
  first cartridge with built-in battery, 205
  first console with modem, 208
  first graphical adventure game, 204
  first licensed home video game, 204
  first notable female protagonist, 205
  first original games, 204

  - first video gaming console, 203
  - home ports of arcade games, 204
  - for Magnavox Odyssey, 203, 204
  - for Mattel Intellivision, 204
  - for Microsoft Xbox, 209–210
  - for Microsoft Xbox Live, 210, 211
  - for Microsoft Xbox One, 211
  - for Microsoft Xbox One X, 212
  - for Microsoft Xbox 360, 210, 211
  - motion-control devices and, 211
  - for NEC PC-Engine/Turbografx-16, 205–206
  - for NES/Nintendo Famicom, 204–205
  - for Nintendo GameCube, 209, 210
  - for Nintendo 64, 208
  - for Nintendo Switch, 212–213
  - for Nintendo Wii and Wii U, 211, 212–213
  - for SEGA Dreamcast, 208–209
  - for SEGA Genesis/SEGA Mega Drive, 206–207
  - for SEGA Master System/SEGA Mark III, 205
  - for SNES/Super Famicom, 206
  - for Sony PlayStation, 207–208
  - for Sony PlayStation 4, 211–212
  - for Sony PlayStation 3, 211
  - for Sony PlayStation 2, 209
  - for Studio II (RCA), 203
  - three-dimensional graphics in, 207–209
  - transition from 8-bit to 16-bit consoles, 205–206
  - virtual reality games, 212
  - *See also individual consoles*
- Contemplative games, **213–215**
  - adventure games, 214
  - *Everything*, 214
  - graphics technology and, 213
  - in history of computer games, 196
  - *Myst*, 213–214, 680
  - *The Night Journey*, 214
  - nonnarrative games, 214
  - precursors and history, 213
  - puzzle games, 213–214
  - *Riven*, 214, 865
  - story-based games, 214
  - thatgamecompany games, 214
  - walking simulators, 214
- Controllers, **215–217**
  - arcade cabinet controllers, 215
  - balance boards, 217
  - brain-controlled devices, 217
  - camera controllers, 215

  dance pads, 217
  definition of, 215
  gamepads, 215–216
  joysticks, 215, 216
  keyboard and mouse, 216
  light gun, 216
  motion-sensing controllers, 216
  musical instrument controllers, 216
  touchscreen devices, 216–217
Conventions, **217–218**
  audiovisual conventions, 217–218
  gameplay conventions, 218
  gender conventions and stereotyping, 217
  genre conventions, 217–218
  rules compared with, 217
Cooperative gameplay, **218–220**
  artificial intelligence in, 219
  definition of, 218
  early history of, 218–219
  Fire Truck, 219
  list of top ten cooperative games, 219
  online multiplayer games and, 219
  PONG Doubles, 218–219
  Rip Off, 219
  Space Duel, 219
COVID-19 pandemic, 38
Cow Clicker, **220–222**
  Bogost, Ian, and, 220–221, 331, 499
  "cowpocalpyse" conclusion to, 221
  gameplay, 220
  history and development, 220, 331
  impact and legacy, 221
  as incremental game, 499
  social games and, 220–221
  updates, 221
Crash of 1977, **222–224**
  AY-3-8500 chip and, 203, 222, 223, 467
  background and causes, 185, 203, 222–223, 467
  cartridge-based systems and, 223
  Fairchild Channel F and, 102, 223, 322
  impact and significance of, 222, 223
Crash of 1983, **224–226**
  arcade video game market and, 51, 52, 224–225, 467–468, 1142
  background and causes, 58, 76, 145–146, 204, 224–225, 507, 713
  end of, 225, 468, 531, 711
  E.T.: The Extra-Terrestrial and, 13, 76
  impact and significance of, 224
  impact on Activision, 10

  - impact on Atari, 76, 79, 84, 86, 225, 226
  - impact on Bally, 103
  - impact on Coleco, 187
  - impact on game-focused print publications, 536–537, 844
  - impact on Mattel, 225, 468, 611
  - impact on SEGA, 894
  - impact on Sierra Entertainment, 918
  - impact on Zircon, 323
  - laserdisc games and, 225, 557
- Crawford, Chris, **226–227**
  - at Atari, 226
  - *Balance of Power*, 226
  - *Eastern Front*, 226
  - *Excalibur*, 226
  - as freelance designer, 226
  - "The Future of Wargaming" *(Computer Gaming World)*, 200
  - on game design as art form, 64
  - Game Developers Conference founder, 226, 227, 368
  - *The Global Dilemma: Guns or Butter*, 1001
  - *Gossip*, 226
  - *Journal of Computer Game Design* founder, 226, 227
  - public release of source code, 227
  - published books, 226–227, 1107
  - *Storytron* (engine), 227
  - *Tanktics*, 226, 1135
  - on verbs and actions in narrative content, 684
  - *Wizard*, 226
- Crowther, Will, 17, 18, 328, 421, 591, 891, 1033
- Csikszentmihalyi, Mihaly, 284, 496, 579
- *Cuphead*, **227–229**
  - art style, 42, 227, *228*
  - boss battles, 228
  - gameplay, 227–228
  - for Microsoft Xbox One, 645
  - run-and-gun levels, 228
  - StudioMDHR and, 227
- Cutscenes, **229–232**
  - in *Abzû*, 5
  - in *Call of Duty* series, 135, 1154
  - CD-ROM technology and, 150–151
  - definition of, 229, 974
  - emotion through, 295
  - fast-forwarding through, 298
  - hand-drawn animation for, 230
  - horizon of expectations and, 231
  - influence of film on, 230–231
  - introductory and closing roles of, 231
  - key roles of, 231

  live-action cutscenes, 229–230
  localization and, 577
  in *Metal Gear* series, 625, 626
  narrative space and, 974, 975
  precursors and history, 229
  pre-rendered CGI cutscenes, 230
  quick time events (QTEs) as, 821
  real-time rendering of, 230
  remediation and, 836–838
  in survival horror games, 1015
  suspension of time through, 1042–1043
  types of, 229–231
  in YouTube Poop (YTP) videos, 781
CVC GameLine Master Module, 86, 197, **232–234**, 468
  competitions, 232–233
  Gameliner Magazine, 233
  history and development, 232
  in history of online games, 748
  impact and legacy, 233–234
  registration fee and membership benefits, 232
  response from third-party publishers, 233
  technical specifications, 232
  von Meister, William, and, 232
Cyan Worlds, **234–236**
  characteristics of games by, 235
  Cosmic Osmo, 234, 839, 1115
  history and founding, 234
  impact and legacy, 236
  The Manhole, 20, 146, 197, 234, 469
  Miller brothers and, 234, 235–236, 986
  Myst, 234–235
  Obduction, 235
  Riven, 234–235
  Uru: Ages beyond Myst, 234, 235
  Vander Wende, Richard, and, 234–235
  See also Myst; Riven
Czech Republic, **236–238**
  activist digital games, 236–237
  Beat Saber, 236, 238, 310, 420, 483, 746, 1124
  British influence on video game industry, 236
  contemporary production companies, 237–238
  Czech-language text adventure games *(textovky)*, 236–237
  Euro/American Truck Simulator series, 236, 238
  Kingdom Come: Deliverance, 236, 237–238
  legalized private enterprise after Velvet Revolution, 237
  Samorost series, 236, 238
  Soviet era, 236–237

Dabney, Ted
  Atari cofounder, 73–74, 76, 127, 202
  Computer Space and, 202, 466, 981
  PONG and, 798
  Syzygy Engineering cofounder, 73, 127
Dance Dance Revolution, **239–240**
  biomechanics and, 113
  competitions, 239
  dance pad, 239, 470, 860
  exergaming and physical health, 240, 458
  gameplay, 239
  gestural interfaces, 417–418
  in history of arcade games, 54
  impact and legacy, 239–240
  Konami and, 110, 553–554
  Konami Code (cheat) and, 160
  music, 239–240, 675
Dance games. *See* Rhythm and dance games
Dance Rush, 110
Data East Corporation (DECO). *See Capcom USA v. Data East; Data East USA v. Epyx;* DECO cassette system
Data East USA v. Epyx, 141, 142, **240–241**
  appeals court decision, 241
  background and case details, 240
  district court decision, 241
  impact and significance, 241
Dating sims, **241–242**
  definition of, 241
  for female audiences, 241–242
  gameplay, 242
  goal of, 242
  for male audiences, 241–242
Death and resurrection, **243–246**
  death of avatars, 243–244
  deludic play and, 244–245
  educational function of, 243–244
  Gothic aesthetics, 243
  killing of other players' avatars or NPCs, 244
  machinima (videos of ways an avatar can die), 245
  in MMORPGs, 243
  natural death, 244
  permadeath, 244
  punishment systems, 243–244
  representations of death, 243
  resurrection sickness, 244
  in role-playing games, 244
  soul healers, 244
  symbolic function of, 244

- in *World of Warcraft*, 244

DECO cassette system, **246**, 469, 940
- cabinets and, 49, 246
- game packaging, 246
- history and development, 246
- in history of arcade games, 51, 52
- notable games, 246
- reception and sales, 246

Defender, 224, **246–247**
- for Atari VCS 2600, 85, 195
- controller, 247
- difficulty of, 246–247
- gameplay, 247
- in history of arcade games, 51
- in history of video games, 467
- Jarvis, Eugene, and, 246, 247, 1142
- maps, 595
- Midway Games and, 649
- off-screen space, 104, 247
- scrolling, 247, 441, 915
- Williams (company) and, 246, 1142

Deludic play, **247–249**
- countergaming and, 248
- definition of, 247–248
- forms of, 248
- symbolic representation of death, 244–245

Demoscenes, **249–253**
- Commodore Amiga demos and groups, 251, 252–253
- Commodore 64 demos and groups, 249, 250–251, 252, 253
- cracker subculture and, 250
- definition of “demos,” 249
- definition of “demoscenes,” 249
- demo compo (competition), 250
- demoparties, 249–250, 252
- in Eastern Europe, 251–252
- in Germany, 414
- group members, 249
- history of, 250
- impact of, 252–253
- megademo genre, 251
- MOS-Technology VIC-20 chip and, 250–251
- PC-based demoscenes, 252
- postal mail used by, 252
- sceners (members), 249
- in Western Europe, 251

Denmark, **253–255**
- artistic video games for adults, 254
- children’s video games, 254

  - Dava-Tronic Video Sport (console), 254
  - *A Hat in Time*, 254
  - *Hitman* series, 254, 311, 839, 998
  - *Inside*, 254
  - *Kaptajn Kaper i Kattegat (Privateer)*, 254
  - Kele-Line (company), 254
  - *Limbo*, 254
  - *Nimbi*, 253–254
  - *Sword of Sodan*, 254
  - television video games, 254
  - Unity (engine), 254
  - *The Vikings*, 254
- Design. *See* Game design
- *Destiny* series
  - Bungie and, 124, *125*, 126, 212
  - *Destiny* (2014), 124, *125*, 126, 212
  - *Destiny 2*, 12, 124, 126, 363, 488
  - *Destiny 2: Shadowkeep*, 124, 126
- Digital Games Research Association (DiGRA), **255–256**
  - approach and focus of, 255–256
  - conferences, 255
  - history and origins, 255
  - purpose of, 255
- Digital Games Research Center (DIGAREC), **256–257**, 411–412
  - collaborations, 257
  - conferences and lectures, 256–257
  - *DIGAREC Series*, 257
  - history and founding, 256
  - International Computer Games Collection, 256, 413
- Dimensionality, **257–261**
  - axonometric projections and, 258
  - in *FeZ*, 260
  - fifth generation of home consoles and, 259
  - overlapping planes and, 258
  - polygonal 3-D imagery, 259
  - pre-rendered images and, 259
  - restricted dimensionality and mixed dimensionality, 259–260
  - simulations of 3-D environments, 257–259
  - two-dimensional games, 257
  - vector graphics and, 258
  - virtual and augmented reality, 261
  - in *Xannon*, 258
- DIP switches. *See* Dual in-line parallel switches
- Disabilities
  - definition of, 6
  - developmental, 281
  - hearing, 7, 8
  - motor, 7, 8

  utility of video games for people with, 816
  visual, 7, 8
  See also Accessibility
DJ Hero, 464, 860
Donkey Kong
  Arakawa, Minoru, and, 48
  cabinet, 461
  checkpoints, 162
  cutscenes, 836
  in history of console-based games, 205
  as in-game feature of *Animal Crossing*, 37
  Mario series and, 600
  masculinity and, 602
  Nintendo and, 530–531, 709
  race and, 826
  replay of, 841
  Universal City Studios, Inc. vs. Nintendo Co. Ltd. and, 1077–1078
Donkey Kong Country, 206, 441, 1011, 1074
Donkey Kong 64, 208, 724
DOOM, **261–263**
  adaptations of, 263, 1098
  Carmack, Adrian, and, 492
  controversy, 537, 664
  conversion mods, 165
  DOOM 3, 778, 839
  DOOM 2: Hell of Earth, 935
  DOOM VFR, 957
  game engine, 492, 494, 1072
  gameplay, 262
  history and development, 492–493
  in history of console-based games, 212
  in history of FPSs, 350–351, 1072
  in history of graphics, 442
  in history of shareware games, 912
  in history of shooting games, 915, 916, 917
  in history of simulation games, 935
  Id Software and, 261, 262, 263, 492
  impact and significance of, 261–262, 263, 492–493
  in-game esports, 304
  innovations, 262
  in list of most important digital games of all time, 335
  maps, 595
  mixed dimensionality, 259, 260–261, 976
  narrative space, 974
  remediation and, 837–838, 839
  screenshot, *262*
  social media and, 943
  software structure, 263

Door games. *See* Bulletin board systems
Dragon Quest series, 532, 678, 724, 870, 961, 993, 994
Dragon's Lair
  animation and graphics in, 41, 52, 163, 259, 344, 440
  checkpoints, 163
  Cinematronics and, 173
  crash of 1983, 225
  cutscenes, 230, 837
  in history of arcade games, 52
  interactive movie genre and, 514, 557
  masculinity and, 602
  Philips CD-i and, 781
  quick time events and, 821
  in *Videotopia* (traveling exhibit), 1117
Dragon's Lair II: Time Warp, 558, 559
DrumMania, 54, 110, 418, 554
Dual in-line parallel switches, **263–264**
  definition of, 263
  notable uses of, 263–264
  purpose of, 263
  in *Sundance*, 173
Duncan, Theresa, **264–265**
  Chop Suey, 264–265
  early career, 264
  game design philosophy, 264–265
  A History of Glamour (film), 265
  Smarty, 264, 265
  Zero Zero, 264, 265
Dungeons & Dragons (tabletop role-playing game), 18, 219, 328, 461, 606, 670, 734, 869, 870, 891, 1001, 1033, 1067, 1105, 1110, 1135, 1148
Dungeons & Dragons (video games), 312, 825, 875
  Advanced Dungeons & Dragons series, 610, 806
DVD and Blu-ray disc games, **265–271**
  BD-J programming and, 268–269, 270
  Blu-ray games, 268–269
  demos and product placement in, 266–267
  DVD games, 266–268
  history of, 265
  interactivity in, 266–270
  market statistics, 266
  Netflix and, 265
  pattern matching in, 267, 270
Dystopian games, **271–276**
  anti-utopia, 274–275
  characteristics of, 271
  classical dystopia, 275
  critical dystopia, variant I, 275
  critical dystopia, variant II, 275–276

  fictional novum in, 271–272
  history the genre, 272–274
  plot structure, 273–274
  Syndicate, 273
  utopian philosophy and, 272, 273, 274, 275–276

EA. *See* Electronic Arts (EA)
Easter eggs, **277–278**
  in *Adventure*, 277
  “beating” a game and, 106
  in *Bioshock Infinite*, 278
  definition of, 277
  in *DOOM II*, 277
  first Easter eggs, 277
  in *Metal Gear Solid*, 626
  metatextuality and, 634
  minigames and, 655
  in *Pac-Man*, 764
  in *Super Mario Bros.*, 277
  text adventure games as, 1034
  unlockable games and, 1078
  in *Video Whizball*, 277
Education (general), **278–280**
  academic departments and perspectives, 279
  game development and, 279
  learning environments of games, 279
  reasons for expanded interest in educational use of games, 278–279
Education (job training), **280–282**
  efficacy of games for job training, 282
  EnterTech Project, 281
  flight and vehicle simulators, 280–281
  games used in military training, 280–281
  history of use of games for job training, 280–281
  serious games, 281
  trends in research and practice, 281
Education (religious), **282–285**
  definition of, 282–283
  notable games, 284
  religious content in games, 284
  religious educational research in video game technologies, 283–284
  views on digital media, 283
Egypt, **285–286**
  Al-Khayal, 285–286
  Ark: Survival Evolved, 286
  ATLAS, 286
  Buha, 285–286
  Instinct Games, 286
  Knights of Light, 286

  - Majaz studios, 286
  - Rumbling Games, 286
  - *Toktok Drift*, 286
- Eighth generation of consoles (2013–), 409–410
  - Microsoft Xbox Game Pass, 410
  - Microsoft Xbox One, 410, 472, 508, 643
  - Nintendo Switch, 409, 451, 472, 508, 725
  - Nintendo Wii U, 409, 472, 731
  - software and services, 410
  - Sony PlayStation 4, 410, 508, 955
  - Sony PlayStation VR peripheral, 410
  - *See also* Generations of technology; *individual consoles*

Elder Scrolls, The series, **286–289**
  cosplayer, *287*
  The Elder Scrolls: Arena, 286, 287
  The Elder Scrolls: Online, 288
  The Elder Scrolls: The Blades, 288
  The Elder Scrolls V: Skyrim, 286, 288, 372, 727, 871, 957
  The Elder Scrolls V: Skyrim V R, 483, 746
  The Elder Scrolls IV: Oblivion, 286, 288, 461, 734
  The Elder Scrolls 6, 289
  The Elder Scrolls III: Morrowind, 286, 288, 594, 807
  The Elder Scrolls II: Daggerfall, 286, 287–288, 806–807
  game genres, 286–287
  game world and gameplay, 287
  history and development, 277–278
  platforms, 286
  stealth games and, 998
Electromechanical games, **289–290**
  controllers, 289
  definition of, 289
  history of, 289
  influence and legacy, 289–290
  pinball, 289
Electronic Arts (EA), **290–293**
  acquisition of Maxis Software, 612–613, 925, 927, 1155
  Battlefield series, 24, 292
  controversy and litigation, 136, 292–293
  Dead Space franchise, 619
  divisions, 292
  EA All Play, 292
  EA Canada, 137
  EA Competitive Gaming, 292
  EA Sports, 292, 335, 352, 353, 989
  EA Worldwide Studios, 292
  game packaging, 762
  Harry Potter series, 291, 342, 1081
  Hawkins, Trip, and, 290, 368, 451–452, 762
  history and founding, 290–291, 451–452, 507
  Molyneux, Peter, and, 660
  NCAA Football series, 352–353
  Probst, Larry, and, 290–291
  in Romania, *291*, 874
  Sims Studio, 613, 927
  Skate or Die!, 290, 452
  West and Zampella vs. Activision and, 1139–1140
  See also FIFA series; *Kirschenbaum v. Electronic Arts; Madden NFL* series; *Sim* series; *Sims, The* series; *Ultima* series
ELSPA. *See* Association for UK Interactive Entertainment (UKIE)

Emotion, **293–297**
  aesthetic design and, 295
  human development and, 294–296
  mirror neuron system and empathy, 295–296
  neurobiology and, 293–295, 296
  physical movement and, 297
  real-world emotions expressed in play, 296–297
  reward and, 294–295
  social emotions, 295
Emulators, **297–299**
  definition of, 297
  legal issues, 298
  new features added by, 298
  user-generated content and, 298–299
Engines. *See* Game engines
Entertainment and Leisure Software Publishers Association. *See* Association for UK Interactive Entertainment
Entertainment Software Association (ESA), **299–300**
  Academy of Interactive Arts and Sciences, 299
  Electronic Entertainment Expo (E3) Tradeshow, 299
  ESA Foundation, 299–300
  history and founding, 299
  mission of, 299
  See also Entertainment Software Rating Board (ESRB)
Entertainment Software Rating Board (ESRB), **300–301**
  categories, 300–301
  history and founding, 299, 300
  submission and approval process, 301
Environmentalism, **301–302**
  EarthGames on Tap (conference), 302
  energy consumption, 301–302
  energy efficiency, 302
  in game content, 302
Epic Games
  Epic Games Poland, 796
  Epic Games Store, 1013
  Gears of War series, 210, 212, 796
  Google Play and, 434–435
  Microsoft and, 212
  shareware games, 911–912
  Tencent and, 428
  Unreal Tournament, 370, 967, 1080–1081
  See also Fortnite; Silicon Knights v. Epic Games; Unreal Engine
Epyx
  Atari Lynx and, 81–82, 448
  game difficulty ratings, 462
  Impossible Mission II, 486
  Ubi Soft and, 486

  World Karate Championship, 240–241
  See also Data East USA v. Epyx
Erikawa, Keiko, **303–304**
  Angelique, 303
  commitment to gender diversity, 303
  Koei Co. cofounder, 303
  Nobunaga's Ambition, 303
  otome games, 303
Esports, **304–307**
  Activision Blizzard and, 11–12
  careers, 144
  in China, 428
  Counter-Strike: Global Offensive eSports event, *305*
  definition of, 304
  doping and, 306
  EA Competitive Gaming, 292
  in Germany, 413
  history of, 304–305
  in Hungary, 489
  in Iceland, 491
  for job training, 281
  Konami and, 554
  Overwatch League, 12, 144, 759–760
  physical nature of, 306–307
  pressure to perform, 305–306
  repetitive stress injuries, 306
  scholarship on, 307
  in Singapore, 939
  skills and knowledge needed for, 306
  in South Korea, 11, 305, 307, 769, 973
  StarCraft and, 996
  in Thailand, 1035, 1037
  Twitch and, 1061–1062
  Xiaobawang system and, 1162
  See also World Cyber Games (WCG)
ESRB. *See* Entertainment Software Rating Board
E.T.: The Extra-Terrestrial, 13, 19, 75, 76, 86, 204, 342, 343, 521, 711, 1102
Europe (Central and Eastern), **307–310**
  countries in, 307
  game development in Cold War era, 308–309
  game development post-Cold War era, 309–310
  history of, 307–308
  international impact of, 309
  platforms and hardware, 308
  small, independent studios, 309–310
  state-sponsored computer clubs, 308
Europe (Western), **310–313**
  Eidos, 311

  - history of computing technology, 310–311
  - Infogrames, 311–312
  - notable video game designers, 311
  - Ubisoft, 312
  - Vivendi Games, 312

EVE Online, **313–314**
  - CCP Games and, 314, 491–492
  - EVE Fanfest, 492
  - *EVE Online* Monument, *314*
  - gameplay, 313
  - glider mod, 447
  - history and development, 313

EVE Valkyrie, 745–746

EverQuest, **314–317**
  - advertising in, 775
  - cooperative social gameplay, 606
  - *EverQuest II*, 24, 161, 317
  - expansions, 316
  - gameplay, 315–316
  - history and development, 314–315
  - McQuaid, Brad, and, 317
  - non-player characters, 735
  - one of first “big three” MMORPGs, 70, 471, 620
  - pay-for transactions, 161, 316–317

EVR Race, 467, 708

Experimental games, **317–319**
  - definition of, 317
  - forms and content, 318–319
  - history of, 317–318
  - home computers and, 318

Facebook
  - *Candy Crush Saga* and, 138, 139
  - *Cow Clicker* and, 220–221, 499
  - cyber-utopianism and, 944
  - *FarmVille* and, 330
  - in history of casual games, 148, 178
  - Oculus acquired by, 481, 510, 742, 745
  - Playfish games and, 739
  - Zapak and, 1168
  - Zynga and, 1174–1176

Failure, **320–321**
  - death and, 321
  - in experimental games, 321
  - game failure compared with nongame failure, 320–321
  - goals and, 320
  - motivation of, 320

Fairchild/Zircon Channel F, **322–323**

  color graphics, 322, 439
  controllers, 322, 518, 541
  crash of 1983, 323
  crash of 1977, 223, 322
  dedicated pause button, 462
  early Easter egg, 277, 323
  first cartridge-based console, 102, 145, 322, 467
  games, 322–323
  history and development, 322
  in history of console-based games, 203
  Lawson, Jerry, and, 322
  price, 322
  second-generation console, 322, 404
  technical specifications, 322
Fallout series, **323–327**
  bullet mode, 260
  dystopian games, 271, 274, 276
  Fallout: New Vegas, 274, 325–326, 1115
  Fallout 4, 271, 276, 326–327, 854, 1001, 1115
  Fallout 4 VR, 483
  Fallout 1, 324, 871
  Fallout 3, 92, 156, 325, 379, 501
  Fallout 2, 324–325
  game manuals and game guides, 379, 1132
  stealth in, 998
  strategy gameplay, 1001
  video games within video games, 1115
Famicom. *See* Nintendo Entertainment System (NES)/Nintendo Famicom
Fandom, **327–330**
  cosplay (costume playing), 328
  definition and features of, 327
  history of, 327–328
  impact of World Wide Web on, 328–329
  impact on industry of, 328
  live-action role-playing (LARP), 328
  origin of the term, 327
  scholarship on, 329
FarmVille, **330–331**
  Cow Clicker and, 220, 331
  Facebook and, 330
  gameplay, 330–331
  history and development, 178, 330
  in-game advertising, 331
  in-game fund-raising, 331
  Zynga and, 330–331, 1174, 1175
Femininity, **331–334**
  female game developers, 332–333
  gamer demographics, 331

  Gamergate and, 333
  Lara Croft and, 332
  representation of females in video games, 331–332
  types of female game players, 332
  Womenize! (conference action program), 333
FIFA series, **334–336**
  EA Sports and, 292
  FIFA 18, 156–157, 292
  FIFA 19, *196*
  FIFA 17, 645
  FIFA 10, 562
  Frostbite 3 engine and, 336
  gameplay, 335–336
  in Germany, 413
  history and development, 335
  in history of sports games, 989, 991
Fifth generation of consoles (1993–2002), 406
  Apple Bandai Pippin, 45
  Atari Jaguar, 406
  diverse hardware of, 406
  Nintendo 64, 406, 723
  polygonal 3-D imagery in, 259
  SEGA Saturn, 406, 906
  Sony PlayStation, 406
  3DO Interactive Multiplayer, 406
  See also Generations of technology; *individual consoles*
Fighting games, **336–340**
  characters in, 338
  defense in, 337–338
  definition of, 336
  goals of, 336
  history of, 339–340
  offense in, 337
  spatial configurations and, 338–339
Film, **340–345**
  adaptions of video games, 13, 341–342
  comparisons of film and video game industries, 342–343
  convergence culture and, 342, 344
  crash of 1983, 343
  influence of video games on, 341–342
  influence on video games, 343
  Metal Gear series influenced by, 625–626
  renewed focus on interactive divisions, 344
  shared historical origins of film and video games, 340–341
Final Fantasy series, 532
  Final Fantasy XI, 161
  Final Fantasy IV, *734*, 735
  Final Fantasy VII, 207, 230

  Final Fantasy VI, 206, 736
  Final Fantasy X, 209
  Final Fantasy XIII, 296
  gameplay, 961
  music in, 673
  for SNES, 206, 1012
  Square Enix and, 993, 994
Finland, **345–347**
  early video games, 346
  game museums and research, 347
  game publications, 345
  gaming and industry statistics, 346–347
  mobile gaming, 346–347
  Nokia, 346
  Rovio, 347
First generation of consoles (1972–77), 404
  Coleco Telstar, 404
  crash of 1977, 203
  dedicated systems connected to a television, 404
  Home PONG, 404
  Magnavox Odyssey, 404, 673
  See also Generations of technology; *individual consoles*
First multiuser domain (MUD), 591, 670, 870, 1110–1111
"First" video game, **347–349**
  Baer, Ralph, and, 348
  definitions and terminology, 347–348
  early simulation games, 348
  Magnavox Odyssey and, 348
  patent for "Cathode-Ray Tube Amusement Device," 347–348
  PONG, 348
  Spacewar!, 348
  Tennis for Two, 348, 351, 506, 588–589, 989
First-person shooters (FPSs), **349–351**
  avatars and, 349, 350
  Battlezone, 349, 350
  definition of, 349
  DOOM, 351
  electromechanical shooting galleries, 349
  history and origins of, 349–350
  Id Software and, 349, 350, 351
  Maze War, 349–350
  vehicles in, 350
  Wolfenstein 3-D, 350, 351
505 Games, 5, 189
5200. *See* Atari 5200
Flashback series, Atari, 17, 87, 226, 478
Fleischer, Max, 41
Fleischer Studios, 41, 42, 227

flOw
  awards and honors, 164–165, 887
  as casual game, 148
  Chen, Jenova, and, 164–165
  as contemplative game, 214
  dimensionality in, 259
  as experimental game, 319
  at Museum of Modern Art, 164–165
  Santiago, Kellee, and, 887
  spirituality in, 987
  thatgamecompany and, 1037
  Zen gaming and, 1173
Flow. *See* Immersion
Flower
  awards and honors, 165, 887
  Chen, Jenova, and, 164, 165
  as contemplative game, 214
  dimensionality in, 259
  environmentalism in, 302, 1018
  as experimental game, 211
  Santiago, Kellee, and, 887
  in Smithsonian Permanent Collection, 165
  spirituality in, 987
  thatgamecompany and, 1037
  Zen gaming and, 1173, 1174
Football games, **351–354**
  action simulation, 352
  arcade games, 352
  computer-based games, 352
  console games, 352
  creative development of, 352–353
  EA Sports and, 352, 353
  extreme simulation, 352
  history of, 352–353
  licensing and, 353
  management simulation, 351–352
  styles of games, 351–352
  2K Sports and, 353
Fortnite, **354–355**
  battle royale genre and, 354–355
  Epic Games and, 434–435, 796
  free-to-play model, 354, 357
  gameplay, 354–355
  history and development, 354, 381
  self-published by Epic Games, 434–435
  success of, 12, 212, 354, 355
  Unreal Engine and, 1083
Fourth generation of consoles (1987–99), 405–406

  NEC PC-Engine/TurboGrafx-16, 405–406
  SEGA Genesis/Mega Drive, 405–406, 508, 902, 904
  16-bit era, 405
  Super Nintendo Entertainment System (SNES), 405–406, 508
  See also Generations of technology; *individual consoles*
France, **355–357**
  consoles, 356
  Enjmin (national school of video games), 356
  "French touch," 355, 356
  game institutions and preservation, 356
  game publishers, 356
  government support of game industry, 356
  home computer games, 355–356
Freemium economic model, 139, 346, 347, 357, 606, 608, 648, 1051, 1174–1175
Free-to-play model, **357–359**
  in Asia-Pacific region, 358
  Candy Crush and, 138, 357–358
  definition and characteristics of, 357
  Dungeon Fighter Online and, 358
  The Elder Scrolls: The Blades and, 288
  Fallout: Shelter and, 324
  Fortnite and, 354, 357
  gold farming and, 433
  history of, 358
  incremental games and, 500
  in Indonesia, 504–505
  metrics and, 357–358
  MMORPGs and, 606
  pay model compared with, 357
  Playrix and, 788–789
  in Russia, 881
  StarCraft and, 994
  touchscreen games and, 1051
  Zynga and, 357
Freud, Sigmund, 492, 811, 814
Fullerton, Tracy, **359–360**
  Electronic Arts Endowed Chair of Interactive Entertainment at USC, 359
  Game Design Workshop (textbook), 359
  Game Innovation Lab director, 359, 986
  The Night Journey, 359, 706
  Spiderdance founder, 359
  Walden, a game, 359

Galaga, 103, 374, 461, 649, 678, 682, 1117, 1171
Galaga '88, 373–374, 692
Galaxy Game, **361–362**
  Computer Space and, 201, 361
  first installed coin-operated video game, 361, 466, 589, 981

  - history and development, 361, 466, 589
  - in history of shooting games, 916
  - Pitts, Bill, and, 361
  - *Spacewar!* and, 348, 361, 466, 589, 981
  - Tuck, Hugh, and, 361
- Gambling, **362–363**
  - influence of video games on casino slot machines, 362–363
  - influence on gameplay, 363
  - platform design and, 362–363
  - random number generator algorithm and, 362
  - requirements and outcomes, 362
- Game, definition of, **363–365**
  - art and, 364
  - game as distinct from video game, 365
  - "magic circle" of play, 364
  - quantifiable outcome and, 364–365
  - *Rules of Play* (Salen and Zimmerman) on, 363–364
  - rules-based nature of games, 363
  - voluntary nature of gameplay, 364
- Game Boy. *See* Nintendo Game Boy
- Game design, **365–368**
  - collaboration and, 367
  - definition of, 365
  - gameplay and, 366–367
  - goal and purpose of, 366
  - history of "design," 365
  - iterative design process, 367
  - meaningful experiences and, 367–368
  - player interaction and interface, 367
  - roles and activities of game designers, 366
  - skills required for, 367
- Game Developers Conference (GDC), **368–369**
  - Adams, Ernest, and, 368, 369
  - Crawford, Chris, and, 226, 227, 368
  - Game Developers Choice Awards, 129, 368–369
  - history and founding, 368
  - International Game Developers Association and, 369, 523
  - Laurel, Brenda, and, 564
  - panels, workshops, and presentations, 368
  - participants, 368
- Game engines, **369–371**
  - audio and, 88
  - Aurora Engine (Bioware), 370–371
  - CryEngine (Crytek), 40, 370, 1082
  - cutscenes and, 229, 230, 837
  - defining characteristics of, 369
  - *DOOM* engine, 492, 494, 1072
  - FPS engines, 370, 371

  - Frostbite 3 engine, 336
  - Gamebryo Engine, 325
  - games as distinct from, 370
  - Genesis 3D engine, 566
  - graphics engine and, 369
  - Havoc SDK, 40
  - in history of animation, 40
  - id Tech engines, 40, 136, 370, 380, 442, 492, 493, 494, 1072, 1081
  - machinima and, 581–582
  - physics engine and, 369
  - *Quake* engine, 40, 370, 380, 442, 493, 1072, 1081
  - RenderWare (Criterion Software), 370
  - SCUMM engine (LucasArts), 20
  - Source Engine (Valve), 370, 784
  - tools, 371
  - Ubisoft engines, 1066
  - Unity, 254
  - Universe Generator System, 166
  - *See also* Unreal Engine
- Game feel, **371–373**
  - attributes of, 372
  - cooking analogy, 371–372
  - definition of, 371, 373
  - of *The Elder Scrolls V: Skyrim*, 372
  - of *Final Fantasy: Tactics*, 373
  - of *Journey*, 372
  - “juice” and, 372
  - polish and, 372
  - simulated space and, 372
  - of *Sonic the Hedgehog*, 371
  - of *Super Mario Bros.*, 371, 372
- Game genealogies, **373–374**
  - definition of, 373
  - *Galaga ’88* example, 373–374
- Game guides, **374–376**
  - by Brady Games, 374–375
  - definition of, 374
  - development process, 376
  - exclusive content, 376
  - history of, 375
  - intellectual property and, 375
  - licensing and contracts, 375–376
  - by Prima Games, 374–375
  - strategy guides, 374
  - unauthorized guides, 375
- *Game Informer*, **376–377**
  - digital publication and website, 376, 377
  - features and areas of focus, 376

  - history of, 377
  - podcast, 377
  - subscription base, 377
- Game manuals, **377–380**
  - Atari VCS 2600 and, 378
  - controllers and, 378
  - definition and purpose, 377–378
  - game guides and, 379
  - history of, 378
  - for MMORPGs, 379
  - narrative and, 379
  - NES and, 378–379
  - for RPGs, 379
- Game modifications, **380–383**
  - accessibility and, 8
  - battle royales and, 354
  - categories of, 380
  - co-creativity and, 177–178, 753
  - controversy, 381
  - *Counter-Strike* and, 380
  - definition of, 380
  - deludic play and, 248
  - fandom and, 328
  - as free downloads, 381
  - hacking and, 447
  - *Half-Life* and, 380
  - hardware modifications, 382
  - in history of real-time strategy games, 1002
  - "Hot Coffee" modification *(Grand Theft Auto: San Andreas)*, 155, 301, 437, 866
  - impact of, 381
  - as independent art, 382
  - legal aspects of, 382
  - metagaming and, 622–623
  - open-source software and, 753
  - profit and other benefits, 381–382
  - protest modifications, 176
  - *Silicon Knights v. Epic Games*, 922–923
  - skinning, 380
  - social media and, 944
  - speedruns and, 984–985
  - tools for, 381
  - total conversions, 380
  - unlocking existing material, 381
  - Unreal Editor and, 1081
  - user interface mods, 382
- *Game Studies*, **383–384**
  - Aarseth, Espen, and, 383, 384
  - content and areas of focus, 383–384

  first issue, 383
  goals of, 383
  history and founding, 383
  readership, 383
  special issues, 384
  Tosca, Susana, and, 383
Game transfer phenomena, **384–385**
  characteristics and behaviors, 384–385
  definition of, 384
  known as “Tetris effect,” 384
  origins of the term, 384
  Ortiz de Gortari, Angelica B., on, 384–385
Game world. *See* World (of a video game)
Game writing, **385–387**
  codifying of narrative information, 386
  skills and challenges of, 386
  writing for traditional media compared with, 386
GameCube. *See* Nintendo GameCube
GameLine. *See* CVC GameLine Master Module
Gameplay. *See* Play
Gamergate, **387–389**
  ethics and, 388
  feminism and, 388
  harassment and, 387–389
  history and origins of, 387
  masculinity and, 604
  origins of the term, 387–388
  Quinn, Zoë, and, 387–388, 604
  rhetorical strategies of Gamergaters, 388–389
Gamers Outreach Foundation, **389–390**
  focus of, 390
  history and founding, 389–390
Games, philosophical critique of, **390–393**
  Aristotle, 390
  categorization of games, 392
  Encyclopédie (Diderot and d’Alembert), 391
  Game Philosophy Network, 392
  games as childish, 391
  happiness and, 391
  Huizinga, Johan, 391–392
  Kant, Immanuel, 391
  Leibniz, Gottfried W., 391
  Pascal, Blaise, 390
  Plato, 390
  qualitative approach, 391–392
  Schiller, Fredrich von, 391
  in varied disciplines, 391
Games and Culture, **393–394**

- content and areas of focus, 393
- goals of, 393
- history and founding, 393
- review and submission process, 393–394
- special issues, 393

Games Done Quick (GDQ), **394–395**
- Awesome Games Done Quick, 394, 1045
- history and founding, 394
- Summer Games Done Quick, 394
- *See also* Speedruns

Gamification, **395–398**
- cultural history of, 396
- definitions of, 395, 396–397
- game design elements and, 395–396
- historical comparative perspective on, 396
- ludification and, 396
- use of the term, 395

Garriott, Richard, **398–399**
- Destination Games cofounder, 399
- early years and education, 398
- "massively multiplayer online role-playing game" coined by, 606
- Origin Systems cofounder, 398–399
- *Shroud of the Avatar* and, 399
- *Ultima* series and, 19, 398–399, 468, 892, 986, 1067, 1068

GCE/Milton Bradley Vectrex, **399–401**
- crash of 1983, 400
- game library, 400, 467, 1088
- game packaging, 761
- history and development, 399–400
- homebrew activity, 477, 856, 1088
- launch, 400
- *MineStorm* (built-in game), 400
- peripherals, 258, 400, 772, 1038–1039
- price, 400
- public domain release of hardware and software, 400
- second-generation console, 399
- technical specifications, 400
- vector graphics, 399, 467, 1088

GDC. *See* Game Developers Conference

Gee, James Paul, 364, 986, 1094

Gender, **401–403**
- actions of female characters, 401–402
- avatars and, 401
- game industry and, 402–403
- images of female characters, 401
- players' gameplay interests and preferences, 402
- *Portal* series and, 800
- video game content and, 401–402

- *See also* Femininity; Masculinity

Genealogies. *See* Game genealogies

Generations of technology, **404–411**
- eighth generation (2013–), 409–410
- fifth generation (1993–2002), 406
- first generation (1972–77), 404
- fourth generation (1987–99), 405–406
- second generation (1976–84), 404–405
- seventh generation (2005–13), 407–408
- sixth generation (1998–2004), 406–407
- third generation (1983–85), 405
- *See also individual generations*

Genesis. *See* SEGA Genesis/SEGA Mega Drive

Germany, **411–415**
- BSS01 (console), 415
- Computerspielemuseum (Computer Game Museum), 413
- cultural research and game studies, 411–412
- demoscenes, 414
- game developers, 413–414
- gaming hardware, 414–415
- popular game genres, 413
- public support programs, 412–413
- Unterhaltungssoftware Selbstkontrolle (USK) rating system, 412, 413
- video game imports, 413
- “war game,” 411
- world’s largest computer games collection, 413

Gestural interfaces, **415–420**
- definition of, 415
- future of, 419–420
- history of interfaces for video games, 416–417
- implications of interface design on interactivity, 418–419
- origins of human-machine interfaces, 416

Gibson, William, 1105

Girls’ games, **420–423**
- *Barbie Fashion Designer*, 421
- Change the Game (Google Play program), 421
- *Colossal Cave Adventure*, 421
- definition of, 421
- female-owned and female-designed software companies, 421
- gender stereotypes and, 421
- gender-based preferences for games, 421–422
- Girls Make Games (summer camps), 421
- NES and, 420–421
- notable games, 422

Githuku-Shongwe, Anne, **423–424**
- Afroes Games founder, 30, 423
- awards and honors, 424
- design philosophy of, 423

  representative for UN Women's South Africa Multi-Country Office, 424
  See also Afroes
Glitches, **424–426**
  as computer errors, 425
  cultural studies and, 425
  definition of, 424–425
  glitch art, 425–426
  semiotic qualities of, 425, 426
Global reach of games, **426–429**
  China and, 427–428
  game studies and, 428
  holding companies and, 427–428
  League of Legends and, 427
  microtransactional monetization and, 427
  transnational political economy and, 426, 427–428
  uneven experiences of globalization, 427
God games, **429–431**
  Black & White series, 430
  definition of, 429
  From Dust, 431
  interactive absorption, 429
  Little Computer People, 430–431
  player-game phenomenon as divine-human metaphor, 429–430
  Pocket God, 431
  Populous series, 430
  religion and, 430
  Reus, 431
  screens and play space, 429
  SimCity, 429, 430
  simulation of divine experience, 429
  Utopia, 430
Gold farming, **431–434**
  controversy, 432–433
  definition of, 431
  game design and, 432
  history of, 431
  industry statistics, 432
  in MMOGs, 431–432
  in multiuser dungeons, 431
  philosophy of play and, 432
Google Play (portal), **434–435**
  developers and, 434
  Fortnite controversy, 434–435
  game library, 434
  third-party apps, 434
Gottlieb, 49, 289
  Humpty Dumpty, 521
  *Q*bert*, 52, 819–820

Grand Theft Auto series, **435–438**
  as adventure games, 21
  controversy, 92, 155, 209, 301, 437, 438, 538
  Grand Theft Auto (1997), 435–436, 480
  Grand Theft Auto: San Andreas, 92, 155, 301, 436, 437, 464, 561, 809–810, 866, 1115
  Grand Theft Auto: Vice City, 436, 1071
  Grand Theft Auto: Vice City Stories, 676
  Grand Theft Auto V, *436*, 437–438, 576, 662, 867
  Grand Theft Auto IV, 436, 437, 438, 629, 974, 1115
  Grand Theft Auto IV: Special Edition, 618
  Grand Theft Auto Online, 438
  Grand Theft Auto VI, *438*
  Grand Theft Auto III, 209, 435, 436, 437, 664, 866
  Grand Theft Auto II, 435–436
  history and development, 435
  "Hot Coffee" mod *(Grand Theft Auto: San Andreas)*, 155, 301, 437, 866
  morality in, 664
  NPCs in, 736, 737
  procedural rhetoric and, 809–810
  reception, 436, 437
  representations of Latinos, 561, 563
  Rockstar Games and, 436, 437, 866, 867
  role-playing elements, 437
  sandbox games, 872
  urban spaces and hip-hop culture, 436, 464
  video games within video games, 1115
Graphics, **438–443**
  artificial intelligence and, 442–443
  "Brown Box" prototype and Magnavox Odyssey, 439
  in CD-ROM games, 440–441
  color technology, 439–440
  definition of, 438
  digitized images and video, 440–441
  game engines and, 442
  graphical adventure game genre, 440
  in laserdisc games, 440
  overlays, 439
  prerendered synthetic images, 441
  scrolling and, 441
  second generation of consoles and, 439–440
  sprites, 440–441, 442
  vector graphics, 441–442
Guides. *See* Game guides
Guitar Hero series, 11, 190, 209, 219, 418, 675, 816, 860, 861, 951, 952
GuitarFreaks, 54, 110, 418, 554, 675, 860

Hacking, **444–447**

- collective hacking, 447
- counterculture and, 445
- cracking, 445
- definition of, 444
- early aesthetics of, 444–445
- first written description of computer hacking, 444
- hacking ethos, 446–447
- hacktivism movement, 445–446
- history of, 444–446
- modding, 446–447
- open-source movement and, 445
- professionalization of, 445
- of source code, 446

Halo series
- Cortana as mediator, 43
- *Halo* (2001), 132, 603
- *Halo* (film project), 14, 341, 344
- *Halo: Combat Evolved*, 124, 126, 175, 209, 389, 407, 643, 876, 916, 1150, 1159
- *Halo: Reach*, 27–28, 126
- *Halo 5: Guardians*, 212, 645, 877
- *Halo 3*, 126, 210, 390, 762
- *Halo 3: ODST*, 126, 876
- *Halo 2*, 126, 209, 407, 614, 643, 976, 1063
- *Halo 2600*, 87
- in Mexico, 639
- Microsoft Xbox and, 124, 126, 643, 645
- Ross, Bonnie, and, 876–877

Handheld games, **447–451**
- for Atari Lynx, 448, 449
- early examples of, 447–448
- for Game Boy series, 448–450
- for Milton Bradley Microvision, 448, 471, 507
- new technologies and, 450
- for Nintendo Game & Watch, 448, 503, 507, 708–709, 719, 727, 1113, 1164
- *Pokémon* series, 449–450
- *Tetris*, 449
- *See also* Atari Lynx; Nintendo Game Boy

Harrison, Bill, 97, 494–495

Hawkins, Trip, **451–453**
- Digital Chocolate founder, 452
- education and early career, 451–452
- Electronic Arts founder, 290, 368, 451–452, 762
- If You Can founder, 452
- packaging innovations of, 762
- 3DO Interactive Multiplayer and, 451, 452, 1040, 1041

HDTV games, **453–454**
- HDTV history and development, 453–454
- notable HD games, 454

Health (mental), **454–458**
  cultural norms and, 455
  DSM-5, 455–456
  Internet gaming disorder (IGD), 455–456
  research on video games and, 455
  Ryff scales of psychological well-being, 454–455
  video game–based interventions and treatments, 456
Health (physical), **458–459**
  early criticisms of video games and, 458
  repetitive stress injuries, 458
  sedentary nature of video games, 458
  video games used in therapy and rehabilitation, 458–459
  video games used to promote movement, 458
Heineman, Rebecca, **459–460**
  administrative and publishing career, 459–460
  awards and honors, 460
  early game developer career, 459
  on future of independent game development, 460
  LGBTQ+ rights advocacy, 460
  winner of National *Space Invaders* Championship, 459
  writer for *Electronic Games*, 459
Heir, Manveer, 825, 827
Help function, **460–463**
  adjustable difficulty, 462
  adventure games and, 461
  history of, 460–461
  managing the performance, 462
  pause function, 462
  role-playing games and, 461
  tutoring the player, 460–461
Higinbotham, William, 348, 506, 588–589, 989
Hip-hop, **463–466**
  action games and urban settings, 464–465
  definition of, 463
  game design and, 464
  global conglomerates and, 465
  history of, 463
  influence of video games on, 463–464
  influence on video games, 464–465
  soundtracks for in-game advertising, 465
History of video games, **466–473**
  advergames, 472
  arcade games, 467
  Atari and, 466–467
  Baer, Ralph H., and, 466
  ball-and-paddle games, 466–467
  Brown Box prototype, 466
  CD-ROM technology and, 468–469

  - *Computer Space*, 466
  - crash of 1983, 467–468
  - crash of 1977, 467
  - handheld games, 471
  - home computers and, 468
  - Magnavox Odyssey and, 466
  - MMORPGs, 470–472
  - online games and gaming, 468, 470–471, 472–473
  - patent #2,455,992, 466, 768–769
  - popular culture and, 467
  - 16-bit consoles and, 469–470
  - 64-bit consoles and, 470
  - *Spacewar!*, 466
  - 32-bit consoles and, 470
  - three-dimensional graphics and, 469
  - vector games, 467
  - video game studies and game museums, 472
  - *See also* Generations of technology
- Hollywood cinema. *See* Representations of video games in Hollywood cinema
- HoloLens, **473–475**
  - HoloLens 2, 474
  - Kinect technology and, 473
  - notable games for, 474
  - operating systems, 473
  - price of, 473
  - purpose and operation of, 473
  - used for Remote Assistance, 473
  - used in medicine and education, 473–474
- Home computer games. *See* Computer games
- Home console games. *See* Console-based games
- Homebrew games, **475–478**
  - for Atari Jaguar, 81
  - for Atari 7800, 476, 478
  - collecting, 191
  - in Czechoslovakia, 308
  - definition of, 475
  - for GCE/Milton Bradley Vectrex, 400, 477, 1088
  - history of, 475–476
  - for Magnavox Odyssey, 478
  - Microsoft XNA and, 1162–1163
  - origins of the term, 476
  - for SEGA Game Gear, 902
  - *7800/2600 Monitor Cartridge* and, 476
  - for SNES, 1010
  - *Sound X* and, 476
  - in United Kingdom, 1073
  - for VCS Atari 2600, 87, 476–477, 478
- *Homo Ludens: A Study of the Play-Element in Culture* (Huizinga), 391–392, 483,

484, 583–584, 786, 1109
Hong Kong, **478–480**
  characteristics of gaming, 479–480
  comprehensive game consumption, 479
  early adoption of products and technology, 479
  game development, 480
  game piracy, 479–480
  Japanese games, 479
  mobile gaming, 479
  prevalence of gaming, 478–479
Horror games. *See* Survival horror games
Houser, Sam and Dan, **480–481**
  early careers, 480–481
  early years and education, 480
  Rockstar Games cofounders, 480, 481, 866
HTC Vive, **481–483**
  games for, 482–483
  history and development, 481
  purpose and operation of, 482
  reception and sales, 482
  system components, 481–482
  Vive Pro, 483
Huizinga, Johan, **483–484**
  Caillois, Roger, and, 130–131, 132
  definition of "play," 786
  Homo Ludens: A Study of the Play-Element in Culture, 391–392, 483, 484, 583–584, 786, 1109
  on "magic circle" of play, 364, 583–584, 878, 933, 1120
  play theory, 483–484
  on rules of games, 878, 879
Hungary, **484–489**
  Digital Reality Software, 487
  esports, 489
  freelancer programmers and companies, 487
  game development, 485–487
  game journalism, 489
  game museums and exhibitions, 489
  gaming clubs, 488
  history of computer science, 484
  history of video games, 485
  Microclub of Csokonai, 488
  NeocoreGames, 487
  Novotrade, 485–487
  von Neumann, John, 484

I, Robot, **490–491**
  first three-dimensional game with filled-polygon graphics, 52, 259, 442, 469, 490, 1089, 1170

  - gameplay, 490
  - history and development, 490
  - reception and sales, 490
  - Theurer, Dave, and, 490
- Iceland, **491–492**
  - CCP Games, 491
  - esports, 491
  - financial crisis of 2008, 491
  - gaming and industry statistics, 491
  - gaming culture and conventions, 491–492
  - Icelandic Game Industry (IGI), 491
  - *See also EVE Online*
- id Software, **492–494**
  - Carmack, Adrian, and, 492
  - Carmack, John, and, 492, 493–494, 741
  - *Commander Keen: Invasion of the Vorticons*, 492
  - *DOOM* engine, 492, 494, 1072
  - Hall, Tom, and, 492
  - history and founding, 492
  - in history of FPSs, 349, 350–351, 664, 917
  - in history of game engines, 493–494
  - in history of graphics, 442
  - in history of shareware games, 912
  - in history of simulation games, 935
  - in-game esports and, 304
  - naming of, 492
  - Oculus Rift and, 741, 742
  - *Quake* engine, 40, 370, 380, 442, 493, 1081
  - *Quake III* engine, 136
  - Romero, John, and, 492, 493
  - *See also DOOM; Wolfenstein 3D*
- Idea for home video games, **494–496**
  - first game demos, 494–495
  - Magnavox Odyssey and, 495–496
  - prototype of multigame system, 495
  - *See also* Brown Box (prototype for first video game console)
- Immersion, **496–498**
  - Csikszentmihalyi, Mihaly, on, 496
  - definitions of, 496
  - GameFlow model, 496–497
  - theory of flow, 496
- *Immersion v. Sony*, **498**
  - background and case details, 498
  - decision and damages award, 498
- Incremental games, **498–500**
  - definition of, 498–499
  - history of, 499
  - mobile games, 499

  online games, 499
  RPG elements in, 499
India, **500–503**
  consoles, 501
  economic disparity, 500
  game design and education, 502
  gaming and industry statistics, 500–501
  gaming events, 501–502
  independent games and studios, 501
  Indian places and characters in video games, 501
  indigenously developed games, 501
  online gaming, 502
Indonesia, **503–506**
  categories of video game culture, 504
  consoles, 503–504
  dingdong (arcades popular among youths), 504
  free-to-play games, 504–505
  game development, 504–505
  gaming and industry statistics, 503–504
  Ghost Parade, 504
  Indonesian Game Association (AGI), 503
  Nusantara Online, 505
  Tahu Bulat, 505
Industry, **506–511**
  casual and social games, 509
  crash of 1983, 507
  crash of 1977, 506
  first home game consoles, 506
  first video games, 506
  fourth through eighth generation of consoles, 508
  global recession of 2008, 509
  golden age of video games, 507
  handheld games, 507
  home computer games, 507
  mainframe games, 506
  MMORPGs, 509–510
  third generation of consoles, 507–508
  virtual reality platforms, 510
Infocom, **511–514**
  acquired by Activision, 10, 513
  Cornerstone, 513
  Deadline, 512–513
  Foolblitzky, 513
  in history of text adventure games, 18
  launch of business division, 513
  The Lost Treasures of Infocom and *The Lost Treasures of Infocom II*, 513
  packaging and props, 512–513, 761, 1033
  Z-machine, 512, 1034

  - *Zork* series, 511–512, 513
  - *See also Zork* series

Integrated circuit (IC)
  - Atari Jaguar and, 80, 81
  - large-scale integration (LSI) chips, 102, 222
  - MOS chips, 78, 250–251
  - *PONG* and, 102, 127
  - *See also* AY-3-8500 chip

Interactive movies, **514–517**
  - *The Beast Within: A Gabriel Knight Mystery*, 516
  - CD-ROM games and, 514–515
  - *Dragon's Lair* and, 514–515, 557
  - history of, 514–515
  - laserdisc games and, 514
  - mysteries and detective movie games, 515–516
  - *Night Trap* controversy, 515
  - *Phantasmagoria*, 516
  - production costs of, 516
  - three-dimensional graphics and, 516

Interface, **517–520**
  - action mapping and feedback, 519–520
  - categories of video game manipulation interfaces, 517
  - controllers and, 517–518
  - corporeal interfaces, 517, 518–519, 520
  - definition of, 517
  - digital switch and, 517–518
  - generic, handheld interfaces, 517
  - material foundations of, 517–519
  - screen-augmented interfaces, 517
  - technomimetic interfaces, 517, 519
  - verbal transcoding, 517, 519

International Arcade Museum. *See* Museum of the Game

International Center for the History of Electronic Games (ICHEG), **520–522**
  - collection, 521–522
  - console gaming, 521
  - electronic games defined by, 521
  - exhibits, 522
  - history of gaming, 522
  - mobile games, 521–522
  - personal computers, 521
  - preservation activities, 522

International Game Developers Association (IGDA), **522–523**
  - history and founding, 523
  - mission of, 522–523
  - programs and activities, 523

International Karate, 240–241. *See also Data East USA v. Epyx*

Ireland, **523–526**
  - Atari factory (Tipperary), 523–524

  game industry employment, 524–525
  game production and development, 524, 525
  Imirt (organization), 525
Irrational Games, 114–115. *See also* 2K Games
Italy, **526–528**
  AESVI (association), 528
  Artematica, 526–527
  games with national and regional themes, 527–528
  history of video games, 526–527
  Mangatar, 527
  Milestone, 526–527
  mobile and social games, 527
  Simulmondo, 526

Jaguar. *See* Atari Jaguar
JAMMA standard, **529–530**
  existing game boards supporting, 530
  history and development, 529
  specifications, 529–530
  superseded by JAMMA Video Standard (JVS), 530
Japan, **530–533**
  aesthetic features of Japanese video games, 532
  early history of video games, 530–531
  emergence of new markets, 533
  game production, 531–532
  gaming culture, 532
  hardware production, 530–531
  Jaleco, 530
  Konami, 530
  Nintendo, 530–531
  SEGA, 530
Jarvis, Eugene, 246, 247, 476, 1142
Jenkins, Henry, 13, 14, 342, 619, 662, 663, 775, 838, 920, 927, 942, 1104
Jensen, Jane, **533–534**
  early years and education, 533–534
  Gabriel Knight series, 516, 534, 918
  Oberon Media cofounder, 534
  Pinkerton Road cofounder, 534
  published written works, 534
  at Sierra Online, 534, 1143
Jobs, Steve, 74, 75, 476, 977
Jordan, **534–536**
  Al-Moosiqar, 535
  Arabian Lords, 535
  Jenin: Road of Heroes, 535
  Jordan Game Task Force, 535
  Maktoob, 535
  Maysalward, 534–535

  Quirkat, 535
  Tamatem, 535
  Tariq's Treasure, 535
  Turath, 535
  Wild Races, 535
Journalism, **536–540**
  consumer-oriented game-focused publications, 536–537
  criticism of video game journalism, 539
  early trade magazines, 536
  game-related television, 536
  influence of game publishers over editorial content, 539
  mainstream media crossover, 537–538
  online content, 538–539
  Videogame Style Guide and Reference Manual, 539
Journey
  Abzû and, 5, 1174
  Chen, Jenova, and, 164
  contemplative game, 214
  experimental game, 211, 319
  game feel, 372
  sound effects, 372
  spirituality and, 987
  thatgamecompany and, 1037–1038
Joysticks, **540–545**
  analog, 544
  arcade games and, 541
  Competition Pro 5000, 542, 543
  definition of, 540
  digital, 543–544
  for 8-bit computers, 542–543
  first game joysticks, 541
  history and development, 540–541
  for home computers and consoles, 541–544
  joypads and, 542–544
  non-game uses of, 540–541
  for 16-bit computers, 543
  touchpads and, 543
Juul, Jesper, 785
  on *Animal Crossing* series, 37
  on the casual revolution, 33–34, 1140
  on game saves, 1043
  Game Studies and, 383
  on games as state machines, 841
  on mapping play time onto event time, 1042
  on non-player characters, 735
  on rules, 878

Kaboom!, 10, 405, 810

Karate Champ, 240–241, 339. *See also Data East USA v. Epyx*
Kee Games, 74
  history and founding, 127
  Indy 800, 50
  merger with Atari, 127
  Super Bug, 51, 892, *892*
  Tank!, 104, 127, 322
Killer apps
  definition of, 980
  Doom, 515
  Halo: Combat Evolved, 124
  Myst, 515
  The 7th Guest, 515
  Sonic the Hedgehog, 903
  Space Invaders, 980
  Tetris, 83
Killer List of Videogames (KLOV), **546–547**
  first website, 546, 1118
  history and development, 546, 1101, 1117–1118
  message boards, 547
  Museum of the Game and, 546, 671
  online coin-operated video game database, 191, 546–547
King of Fighters, The series, **547–549**
  characters in, 547–548, 549
  gameplay of, 548
  in history of fighting games, 337, 338, 340
  innovation and change in, 548–549
  The King of Fighters '94, 547
  The King of Fighters 1999, 548
  The King of Fighters 2000, 560
  The King of Fighters 2003, 548–549
  in Mexico, 638
  naming of, 547
Kirby series, **549–550**
  gameplay, 549
  Kirby Battle Royale, 340
  Kirby Star Allies, 550
  Kirby's Adventure, 549
  Kirby's Dream Land, 549
  naming of, 549
  replayability, 549–550
  spin-off games, 550
Kirschenbaum v. Electronic Arts, **550–551**
  background and case details, 550–551
  settlement and aftermath, 551
Kit games, 172, 173
KLOV. *See* Killer List of Videogames
Kojima, Hideo, **551–553**

  early years and education, 552
  Kojima Productions, 553, 957
  Metal Gear series, 207, 551–553, 623–626
  Policenauts, 552
Konami, **553–554**
  early arcade video games, 553
  history and founding, 553
  home console and computer games, 554
  mobile games, 554
  rhythm games, 553–554
  See also Bemani; *Dance Dance Revolution*
Korea. *See* South Korea

Lacan, Jacques, 425, 811, 812, 813
Language, **555–556**
  text-based games, 555
  vocabulary used in multiplayer online games, 555–556
  voice-based communication, 555
Laserdisc games, **556–559**
  Astron Belt, 556–557
  attempted comeback of, 558
  categories of, 556–557
  crash of 1983, 557
  Dragon's Lair, 557
  first laserdisc game, 556
  game genres, 557
  games with overlaid graphics, 556–557
  history of, 556
  home laserdisc systems, 557–558
  interactive movies, 557
  limitations of, 557
  Quarter Horse, 556
  released on CD-ROM and DVD-ROM, 559
Latin America, **559–560**
  game hardware development in, 559
  game piracy in, 560
  Tec Toy (later Zeebo Inc.), 559–560
  Telematch, 559
Latinos and video games, **560–564**
  games with rural settings, 561–562
  games with urban settings, 561
  Grand Theft Auto series and, 561, 563
  online games, 562
  playable Latino characters, 560–561
  sci-fi games, 563
  sports games, 562–563
  stereotypes and racism, 561, 562–564
Laurel, Brenda, **564–565**

  - academic career, 565
  - at Atari, 564
  - at Cybervision, 564
  - early years and education of, 564
  - published written works, 565
  - Purple Moon cofounder, 564–565
- Lebanon, **565–566**
  - Falafel Games, 566
  - *Knights of Glory*, 566
  - Might 3D, 566
  - *Pou*, 566
  - *Special Force* series, 565–566
  - Wixel Studios, 566
- *Legend of Zelda, The* series, **566–572**
  - diegetic temporal exploration, 689
  - first NES cartridge to have battery-backed memory, 405, 462, 568, 889
  - game manual, 378–379
  - gameplay, 567, 568
  - history and development, 566–568
  - *The Legend of Zelda* (1986), 567–568, 922, 1132
  - *The Legend of Zelda: A Link to the Past*, 569
  - *The Legend of Zelda: Breath of the Wild*, 409, *567*, 727
  - *The Legend of Zelda: Four Swords*, 571
  - *The Legend of Zelda: Link's Awakening*, 570, 1048
  - *The Legend of Zelda: Majora's Mask*, 569–570, 689
  - *The Legend of Zelda: Ocarina of Time*, 569, 689, 762
  - *The Legend of Zelda: Oracle of Ages*, 570–571
  - *The Legend of Zelda: Oracle of Seasons*, 570–571
  - *The Legend of Zelda: Phantom Hourglass*, 451, 571, 1049
  - *The Legend of Zelda: Spirit Tracks*, 571
  - *The Legend of Zelda: Twilight Princess*, 570
  - *The Legend of Zelda: Wind Waker*, 570
  - non-player characters, 737
  - Philips CD-i games, 781
  - spin-offs, 572
  - title cards of, 922
  - touchscreen games, 1048, 1049
  - walkthroughs for, 1132
  - *Zelda II: The Adventure of Link*, 568–569
- LEGO video games, **572–574**
  - *LEGO Batman 3*, *573*
  - *LEGO Batman 2: DC Super Heroes*, 573–574
  - *LEGO Fun to Build*, 572
  - *LEGO Island*, 572
  - *LEGO Marvel Super Heroes: The Videogame*, 573
  - *LEGO Racers*, 573
  - *LEGO Star Wars: The Video Game*, 573
  - MMOs, 574

  movie license games, 573–574
  outsourcing and, 757
Leisure Suit Larry series, 117, 179–180, 918
Leonard, David J., 334, 563
Let's Play videos, **574–576**
  characteristics of, 574–575
  gamer capital in, 575
  player as commentator, 575
  research on, 575
Little Big Planet, 211, 371, 381, 835, 954
Little Computer People, 430, 929
Localization, **576–579**
  culturalization and, 578
  definition of, 576
  full localization, 577
  of *Grand Theft Auto V*, 576
  internationalization and, 577
  localization-friendly game development, 577
  self-censorship and, 578
  social media and, 578
  software localization, 576
  transcreation and, 578
  translation hacking and, 577
Logg, Ed
  Asteroids, 75
  Centipede, 75, 100
  Gauntlet, 219
  Othello, 913
Ludology, **579–580**
  as discipline that studies play and games, 579
  origins of the term, 579
  as school of thought, 579
Ludomusicology. *See* Music
Lynx. *See* Atari Lynx

Machinima, **581–583**
  definition of, 581
  history of, 581–582
  licensing restrictions on, 583
  origins of the term, 582
Madden NFL series, 23, 189, 292, 352, 353, 452, 465, 563, 824, 989, 991–992, 1041
Magic circle, **583–584**
  criticism of, 584
  definition of, 583–584
  Huizinga, Johan, on, 364, 583–584, 878, 933, 1120
  Rules of Play (Salen and Zimmerman) on, 584
Magnavox Odyssey, **584–586**

  accessories and peripherals, 417, 518, 585, 586, 772
  Baer, Ralph H., and, 97, 98, 99, 584–585
  first-generation console, 404, 673
  game manual, 378
  games included with, 585
  history and development, 584–585
  in history of video games, 466, 467
  homebrew community and, 477, 478
  launch, 586
  the Netherlands and, 697
  non-U.S. exports of, 559, 586, 1073
  price of, 586
  sales, 495–496
  speech and sound effects module, 772
  See also Brown Box (prototype for first video game console)
Mainframe games, **586–593**
  BASIC and, 590–591
  history of, 586–587
  military and business applications, 587–589, 591
  PLATO (Programmed Logic for Automated Teaching Operations) and, 590
  Spacewar!, 589
  Tetris, 591
  Zork, 511–512, 591, 634, 1033
MAME, **593–594**
  game preservation and, 594
  history and development, 593
  purpose of, 593
Manhole, The, 20, 146, 197, 234, 469
Maps, **594–597**
  automaps, 595
  as game levels, 594
  as introduction to games, 594–595
  as mental maps of game space, 594
  as “second spaces,” 596
  semiotic and pictorial study of, 596
  structure, appearance, and usability of, 595
  within video games, 594
Marathon series
  Bungie and, 125, 643
  Marathon (1994), 125, 261
  Marathon 2: Durandal, 125
Mario Kart series, **597–599**
  gameplay of, 598–599
  Mario Kart 8, 213, 598
  Mario Kart DS, 711
  Mario Kart 64, 208, 599
  Mario Kart Wii, 211, 731
  non-player characters, 736

  Super Mario Kart, *597*, 597–598
Mario series, **600–602**
  in Africa, 28
  collectors and, 190, 191
  Donkey Kong and, 600
  game guides, 1132
  history and development, 600
  in history of console-based games, 205, 206, 208, 210, 211, 213
  in list of most important digital games of all time, 335
  Mario Bros., 600
  merchandising, 617
  metagames and, 622, 623
  music, 678
  for NES/Nintendo Famicom, 716, 717, 718
  for Nintendo DS, 711
  non-player characters, 734, 736
  replay and, 841
  Super Mario Bros. (film), 13, 341, 1097–1098
  Super Mario Bros., 208, 600–601, 841, 976, 1042
  Super Mario Bros. 2, 1132
  Super Mario Bros. 3, 335, 1044
  Super Mario Odyssey, 213, 629, 726
  Super Mario 64, 208, 569, 601
  Super Mario 64 DS, 711
  Super Mario Sunshine, 210, 723
  Super Mario World, 206, 598, 601, 716, 1011
  Super Mario World 2: Yoshi's Island, 1011
  timer in, 1042
  visual space in, 976
Masculinity, **602–605**
  alternative masculinities, 604
  arcade games and, 602
  casual and hardcore games, 603
  dominant video game culture and, 602–603
  Gamergate and, 604
  patriarchy and, 603, 604
  toxic masculinity, 604
Massively multiplayer online role-playing games (MMORPGs), **605–610**
  acquisition of artifacts, 607–608
  avatar creation and customization, 607
  character progression, 607
  chat and messaging, 608–609
  controversy, 609
  definition and characteristics of, 605, 607
  external websites, 609
  free-to-play model, 606
  gold farming, 608
  grinding (repetitive NPC killing), 608

  - groups and guilds, 608
  - in-game economy, 607–608
  - in-game player activity, 606
  - killing enemy non-player characters, 607
  - origins and history of, 606
  - patching of, 606
  - pay-to-play subscription model, 606
  - pick-up group (PUG), 608
  - player-versus-environment gameplay, 606–607
  - player-versus-player combat, 606–607
  - social interaction, 608–609
  - *See also Ultima Online; World of Warcraft (WoW)*
- Mattel Intellivision, **610–611**
  - advertising campaign, 611
  - game library, 610
  - history and development, 610
  - Intellivision Flashback, 611
  - Intellivision II, 611
  - processor and technical specifications, 610
  - second-generation console, 405, 610
  - sold as rebadged unit, 610–611
- Maxis Software, **611–613**
  - acquired by Electronic Arts, 612–613, 925, 927, 1155
  - Braun, Jeff, and, 611–612, 1155
  - history and founding, 611
  - *Sim* series, 611, 612–613
  - *Spore* series, 613
  - Wright, Will, and, 611–612, 1155
- *Maze War*, 349–350, 590, 591, 916, 1145, 1170
- McGonigal, Jane, **613–615**
  - awards and honors, 614
  - director of Game Research and Development (Institute for the Future), 614
  - education and early career, 613–614
  - *I Love Bees*, 614, 643, 1063
  - published written works, 614
  - *SuperBetter*, 614, 908
- Media convergence, 13, 14
- Mega CD. *See* SEGA CD/Mega-CD
- Mega Drive. *See* SEGA Genesis/SEGA Mega Drive
- Meier, Sid, **615–616**
  - awards and honors, 616
  - *Civilization* series, 615–616
  - Firaxis cofounder, 615
  - game credits, 615–616
  - MicroProse cofounder, 615, 640–641
  - *Railroad Tycoon*, 615, 641
  - *See also Civilization* series
- Mental health. *See* Health (mental)

Merchandising, **616–619**
  adult market, 618
  brand extension, 618
  debate and controversy, 619
  definition of, 616
  game characters and, 617
  growth of video game merchandising, 616–617
  limited and collector's editions, 618–619
  Pokémon and, 617–618
Meridian 59, **619–620**, 670–671
  first game considered an MMORPG, 470–471, 620
  gameplay, 620
  history and development, 619–620
  notable "firsts," 606, 620
  player community, 620
  3DO and, 452
Metagames, **620–623**
  definition of "metagame," 620–621
  definition of "metagaming," 621
  experimental metagames, 621–622
  game modifications and, 622–623
  media studies and, 621
  metafiction and, 621
  metagaming as function of narrative, 622
  player communities and, 622
  retro games and, 621
  spectrum of metagaming, 622
Metagaming
  game modifications and, 622–623
Metal Gear series, **623–627**
  add-ons, 624
  controversy, 626
  cutscenes, 625, 626
  Easter eggs, 626
  gameplay, 624–625
  history and development, 623
  influence of film on, 625–626
  Kojima, Hideo, and, 207, 551–553, 623–626
  Metal Gear (1987), 552, 623, 997
  Metal Gear Online, 623–624
  Metal Gear Rising: Revengeance, 624
  Metal Gear Solid (1998), 207, 552–553, 623, 625, 626, 628, 634, 837, 838, 839, 954, 998
  Metal Gear Solid subseries, 192, 209, 553, 623–625
  Metal Gear Survive, 624
  Metal Gear 2: Solid Snake, 552, 623
  noncanonical games, 623–624
  stealth games and, 625, 997–998, 999

  videoludic self-consciousness and, 626
Metalepsis, **627–630**
  breaking the fourth wall and, 628
  definition of, 627
  in metagames, 628–629
  in prevention of piracy and cheats, 629
  rhetorical and ontological heuristic parameters, 629
  self-referentiality and, 627–628
  in video games, 628–629
Metaphor, **630–632**
  cognitive metaphor theory, 631
  definition of, 630, 631
  existential metaphor, 631–632
  game design and, 631–632
  The Marriage and, 630, 631
  Passage and, 630, 631
  proceduralism and, 631
  simulation and, 630–631
  Tetris and, 630
Metatextuality, **632–636**
  degrees of, 633
  Easter eggs and, 634
  metareference and, 633
  metafictionality and, 633
  operational aesthetics and, 634
  remediation and, 634
  rules and, 634
  self-reference and, 633–634
Metroid series, **636–638**
  "beating" a game, 107
  female lead characters, 205, 332
  first notable female protagonist, 205
  gameplay, 636–637
  history and development, 637
  in history of console-based games, 210
  map design, 636
  Metroid (1986), 107, 205, 921
  Metroid: Other M, 211, 637–638
  Metroid: Zero Mission, 638
  Metroid Fusion, 637
  Metroid Prime series, 637, 638
  Metroid II: Return of Samus, 637, 1164, *1165*
  Super Metroid, 206, 637, 1011, 1164
  Yokoi, Gunpei, and, 636, 1164–1165
Mexico, **638–640**
  Aztec Tech Games, 639
  Bromio, 639
  consoles, 638–639

  - Evoga, 639
  - game studios and development, 639
  - gamer and industry statistics, 638
  - HyperBeard, 639
  - *Kleptocats*, 639
  - lack of government support for gaming industry, 639–640
  - Lienzo, 639
  - *Mulaka*, 639
  - *Pato Box*, 639
  - Radical Studios, 639
  - Sabarasa, 639
- MicroProse, **640–641**
  - acquisitions and management changes, 640–641
  - *Civilization* series, 640, 641
  - empire building strategy games, 641
  - history and founding, 640
  - impact and legacy, 641
  - Meier, Sid (cofounder), 615, 640–641
  - Stealey, J. W. “Wild Bill” (cofounder), 615, 640–641
  - *X-Com* series, 640, 641
- Microsoft Kinect, 90, 113, 165, 211, 212, 215, 408, 409, 418, 459, 473, 644, 861, 951, 955, 977, 1025, 1040
- Microsoft Studios. *See* Xbox Game Studios
- Microsoft Xbox, **641–643**
  - controller, 642
  - DVD-ROM drive, 642
  - game library, 642, 643
  - launch titles, 643
  - microprocessor and technical specifications, 642
  - mods for, 642–643
  - naming of, 642
  - reception and sales, 643
  - sixth-generation console, 407, 471, 641
  - Xbox Live service, 642
- Microsoft Xbox One, **643–645**
  - as “all-in-one” system, 643–644
  - eighth-generation console, 410, 472, 508, 643
  - game library, 645
  - game licensing scheme, 644
  - Kinect 2.0 (natural user interface sensor), 644
  - launch, 644
  - reception and sales, 645
  - updated Xbox Live service, 644–645
  - versions, 644
  - Xbox Adaptive Controller, 644
- Microsoft Xbox 360, **645–647**
  - accessories and peripherals, 646
  - first HD-capable console, 645

  - launch, 645
  - partial backward compatibility, 645–646
  - price, 646
  - processor and technical specifications, 645, 646
  - reception and sales, 646
  - seventh-generation console, 407–408, 471, 508, 639
  - Xbox Live service, 646
- Microtransactions, 34, 148, 220, 357, 427, 433, 622, 1051
- Middle East, **647–649**
  - Arab Spring, 648
  - consoles in, 647
  - game development in, 647–648
  - game studios in, 648
  - *Knights of Glory*, 648
  - *Pou*, 648
  - *Revenge of Sultans*, 648
  - *Stone Throwers*, 648
  - *Swords of Glory*, 648
  - *War73*, 648
  - *See also individual nations*
- Midway Games, **649–650**
  - acquired by Bally, 102–103, 649
  - acquisitions of game studios, 649–650
  - bankruptcy, 650
  - early arcade games, 649
  - history and founding, 649
  - pinball, 649
  - popular titles published by, 649
  - Taito and, 649
- Midwest Gaming Classic (MGC), **650–651**
  - events and areas of focus, 650–651
  - history and origins, 650
  - name change, 650
- *Miegakure*, 40, 260
- Military use of games, **651–652**
  - history of, 651–652
  - military-entertainment complex and, 651–652
  - for propaganda and recruitment, 651
  - training simulations, 651
- Miller, Rand and Robyn, 234, 235–236, 986
- Miller, Scott, 492, 911–912
- Milton Bradley Vectrex. *See* GCE/Milton Bradley Vectrex
- *Minecraft*, **652–654**
  - *Fortnite* and, 354–355
  - gameplay, 652–654
  - gaming objectives, 654
  - history and development, 652, 1145
  - impact and legacy, 652

  Microsoft Studios and, 1160
  Minecraft Realms, 654
  Mojang and, 1019, 1160
  play modes, 653–654
  procedural generation, 21, 652–653, 654, 808, 1145
  sandbox game, 652
Minigames, **654–655**
  in *Daxter,* 655
  definition of, 654–655
  in *Knights of the Old Republic*, 655
  in *Ninja Gaiden*, 655
  in *Shenmue,* 655
  "short" games as, 655
  in *Spider-Man*, 655
  unlockable games, 655
Mixed reality (MR), **656–657**
  applications outside video games, 658
  definition of, 656
  Microsoft HoloLens and, 656–657
  virtual reality compared with, 656
MMORPGs. *See* Massively multiplayer online role-playing games
Mobile games, **657–659**
  Angry Birds, 658
  BotFighters, 659
  Clash of Clans, 658
  definition of, 657
  GPS and, 659
  history of, 657–658
  micropayment and digital distribution, 658
  mobile game ecosystems, 658
  online market places, 658
  platform fragmentation and, 658
  Pokémon GO, 658, 659
  Snake, 657–658
  "truly mobile games," 659
  See also Angry Birds; Pokémon GO
Modifications. *See* Game modifications
Molyneux, Peter, **659–661**
  at 22 Can, 661
  awards and honors, 659–660
  Black & White, 430, 660, 664, 933
  Bullfrog Productions cofounder, 311, 660
  early career, 659–660
  at Electronic Arts, 660
  Fable, 210
  god games by, 430–431
  Lionhead Studios cofounder, 311, 660
  at Microsoft Game Studios, 661

  Populous, 430, 431, 660, 924, 986
  software credits, 660
Morality and ethics, **661–665**
  deontology (Immanuel Kant), 661
  embedded values, 662–663
  ethical gameplay, 663
  game design and, 663–664
  moral influence of video games, 662
  utilitarianism, 661
  video games and aggression, 662
  video games and moral development, 662
  virtue ethics, 661, 809
Mortal Kombat, **665–667**
  arcade game, 665–666
  characters, 338
  controversy, 40, 154, 206–207, 300, 339, 515, 666–667, 898, 1011
  film adaptations of, 667, 848
  gameplay, 665–666
  history and development, 665
  home console games, 666–667
  live-action video sequences, 440
  Midway Games and, 649
  Mortal Kombat 4, 340
  Mortal Kombat II, 206–207, 340, 667
  screenshot, *666*
  violence and blood settings, 264
Motion capture and motion control, **667–669**
  applications of, 667–668
  cybernetic systems, 668
  definition of, 667
  electromagnetic mocap systems (magnetic trackers), 668
  electromechanical mocap systems, 668
  history and development, 667
  Microsoft Kinect, 669
  Nintendo Wii Remote, 669
  nonoptical systems, 668
  optical systems, 668
  Sony PlayStation Move, 669
  See also Microsoft Kinect; Nintendo Wii Remote; PlayStation Move
MUDs. *See* Multiuser domains
Multiple Arcade Machine Emulator. *See* MAME
Multiuser domains (MUDs), **670–671**
  commercial online games, 670
  definition of, 670
  first commercial MUD in United States, 670
  first MUD, 591, 670, 870, 1110–1111
  history of, 670
  MUD Connector website, 671

Multi-User Dungeon, 591, 670, 870, 1110–1111
  See also Scepter of Goth
Museum of the Game (MOG), **671–673**
  Arcade Museum Library, Inc. (IAML), 672
  content and services, 671
  notable collection holdings, 671–672
  Penny Arcade project, 672
  physical library, 671
  See also Killer List of Videogames (KLOV); Vintage Arcade Preservation Society (VAPS)
Music, **673–680**
  for arcade games, 673
  branching, 677
  for console games, 673, 674–675
  constraints on, 676
  film music compared with game music, 676–677
  FM synthesis and, 673, 674
  game music in popular culture, 677–678
  for handheld games, 674
  history of music in video games, 673–676
  for home computer games, 673–674
  in Japan, 678
  ludomusicology, 679
  MIDI and, 674
  music games, 675–676
  music production in video games, 676–677
  for Nintendo Game Boy games, 674
  orchestral performances of game music, 678–679
  for PlayStation games, 675
  retro game aesthetics, 678
  Synthwave music genre, 675, 678
  See also Rhythm and dance games
Myst, **680–681**
  analog remediations, 838
  Cyan Worlds and, 234–236
  gameplay, 20–21, 680–681
  graphics, 40, 259, 441
  in history of adventure games, 20–21
  in history of contemplative games, 213–214
  in history of video games, 469
  impact and legacy, 236, 680, 681
  as "killer application," 515
  narrative descriptors, 974
  sequels, 681
  space in, 151, 976
  spirituality and, 986
  See also Riven

Namco, **682–683**
  acquired by and merger with Bandai, 682–683
  golden age games, 682
  history and founding, 682
  Pac-Man, 682
  Ridge Racer (PlayStation), 682
Narrative, **683–686**
  abstract games and, 686
  definition of, 683
  game content and narrative content, 684–685
  game structure and narrative structure, 684
  interactivity and, 684–685
  ludological argument, 686
  multiplayer games and, 685
  narrative theory, 683–686
  narratological argument, 686
  nonplayable scenecuts and, 684
  restricted use of verbs in games, 684
  video games and narratives, 686
Navigation (spatial), **686–688**
  boundaries and, 686, 687–688
  contingent and noncontingent connections, 687
  definition of, 686
  Euclidean space, 686–687
  navigable connections, 686–687
  navigational logic, 688
  non-Euclidean space, 687
  spatial cells and, 686–687
  steering compared with, 687
Navigation (temporal), **688–690**
  as core game mechanic, 689
  definition of, 688
  diegetic temporal exploration, 689
  rewinding time, 689
  slowing of time, 688–689
NCSoft, **690–691**
  acquisition of ArenaNet, 690
  history and founding, 690
  Lineage M, 691
  Lineages, 690
  online gaming, 690
  research and development, 691
NEC PC-Engine/TurboGrafx-16, **691–694**
  adaptations of *Fatal Fury 2* and *Art of Fighting*, 693
  fourth-generation console, 405–406
  game library, 692–693
  history and development, 691–692
  reception and sales, 692–693

  technical specifications, 691–692
  variations of, 692
Neo•Geo, **694–695**
  first system to use memory cards, 694
  game library, 695
  history and development, 694
  price, 694
  processor and technical specifications, 694
NES. *See* Nintendo Entertainment System (NES)/Nintendo Famicom
NetEase, **695–696**
  game guild controversy, 695
  MMORPGs, 695
  portal (NetEase/163.com), 695
  published games, 696
Netherlands, the, **696–699**
  Davilex, 698
  Dutch Game Garden, 698
  game-focused education programs, 698
  Guerilla Games, 696, 698
  history of game development, 697–698
  Magnavox Odyssey and, 697
  Philips, 697
  Philips CD-i, 697
  Playlogic, 698
  Vlambeer, 696, 698
Networked games. *See* Online games
New Zealand, **699–704**
  Advance Automatics, 701
  arcade sector, 700–701
  Chastronics, 701
  computer-focused magazines, 701–702
  console distributors, 701
  consoles, 699–700
  Kitronix, 701
  orphan works and abandonware, 702–703
  Rait Arcade Games, 701
  Taito-tronics, 701
Newsgames, **704–706**
  Cocainenomics, 705
  definition and characteristics of, 704
  gameplay mechanics and logic in, 705
  Half the Sky Movement: The Game, 705
  as journalism, 705–706
  Name Generator, 705
  open-world games, 706
  persuasive intent of, 704–705
  procedural rhetoric and, 706
  Rebuilding Haiti, 704

  Spent, 704
  We Are Chicago, 704
Night Journey, The, **706–707**
  gameplay, 706
  history and development, 706
  reception and honors, 707
Nintendo, **707–710**
  Atari and, 709
  Donkey Kong, 709
  EVR Race, 708
  first purely electronic video games, 707
  history and founding, 707
  opening of New York office, 709
  Radar Scope, 709
  release of Game & Watch series, 708–709
  release of NES, 709
  sales and revenue, 709–710
  Ultra Hand (extendable toy arm), 707
Nintendo DS, **710–711**
  advertising campaigns, 711
  Download Play feature, 710
  game library, 711
  history and development, 710
  naming of, 710
  networking capability, 710
  Nintendo 3DS, 450–451, 710
  nontraditional target market, 711
  technical specifications, 710
Nintendo Entertainment System (NES)/Nintendo Famicom, **711–719**
  chiptune scene musicians and, 718–719
  game library and piracy, 716–719
  history and development, 711–712
  impact and legacy, 718–719
  marketing strategy and licensing policies, 713–716
  NES Cleaning Kit, 716
  processors and technical specifications, 717
  reception and sales, 712
  retro aesthetics and, 718
  speedruns and, 718
  third-generation console, 405, 469, 507–508, 718
  “toaster” moniker, 716
Nintendo Famicom. *See* Nintendo Entertainment System (NES)/Nintendo Famicom
Nintendo Game Boy, **719–721**
  accessories, 720–721
  Game Advance SP, 720
  Game Boy Advance, 720
  Game Boy Color, 720

Game Boy Micro, 720
Game Boy Pocket, 720
impact and legacy, 719, 721
marketing campaigns, 720
processor and technical specifications, 719–720
reception and sales, 719–720
Super Game Boy, 721
Yokoi, Gunpei, and, 448, 471, 719, 1164

Nintendo GameCube, **721–723**
  first console to use optical medium, 722
  game library, 722
  microprocessor and technical specifications, 721–722
  price, 722, 723
  reception and sales, 722–723
  sixth-generation console, 407, 471, 721
  third-party support, 722
Nintendo 64, **723–725**
  accessories and peripherals, 724–725
  fifth-generation console, 406, 723
  first console to use unified memory subsystem, 724
  game library, 724
  limited third-party support, 724
  processor and technical specifications, 724
  reception and sales, 724
Nintendo Super Famicom. *See* Super Nintendo Entertainment System (SNES)/Super Famicom
Nintendo Switch, **725–727**
  docked and handheld modes, 726
  eighth-generation console, 409, 451, 472, 508, 725
  game cards (cartridges), 726
  game library, 727
  internal storage, 726
  Joy-Cons, 726
  marketing campaign, 726
  multiplayer mode, 725, 726
  online service, 726
  price, 725
  system components, 726
Nintendo Virtual Boy, **727–728**
  classification of, 728
  glasses technology, 727–728
  history and development, 727
  monochromatic game imagery, 728
  price, 728
  reception and sales, 727, 728
Nintendo v. Blockbuster Video, **728–729**
  background and case details, 728–729
  impact of, 729
  settlement, 729
Nintendo Wii, **729–731**
  controller, 729–730
  game library, 731
  history and development, 729–730
  interface, 730
  media drive, 730

  - seventh-generation console, 408, 471, 508, 729
  - technical specifications, 730
  - third-party support, 731

Nintendo Wii Remote, 211, 216, 570, 669, 729–730, 732, 772, 861, 1140

Nintendo Wii U, **731–733**
  - 8 GB and 32 GB versions, 733
  - eighth-generation console, 409, 472, 731
  - embedded touchscreen, 731, 732
  - game library, 733
  - GamePad (controller), 731, 732
  - history and development, 731–732
  - online functionality, 733
  - Pro Controller, 732
  - reception and sales, 733
  - Virtual Console service, 733

Non-player characters (NPCs), **734–738**
  - becoming playable characters, 736
  - believability of, 734
  - definition of, 734
  - repetitiveness and adaptability, 735–736
  - values and NPC interaction, 737

North America. *See* Canada; Mexico; United States of America

Norway, **738–740**
  - Bertheussen IT, 739–740
  - dedicated funding scheme for game development, 740
  - Dirtybit, 739
  - Funcom, 739
  - *Fuzzball*, 739
  - game development companies, 739–740
  - gaming and industry statistics, 738
  - Playfish, 739
  - Scangames Norway, 739
  - *Wordfued*, 739–740

NPCs. *See* Non-player characters

Nutting Associates
  - Atari’s founding and, 49, 73, 202
  - *Computer Space*, 49, 57, 73, 127, 202, 981
  - *Missile Radar*, 50

Nvidia
  - 3D Vision technology, 1039
  - GeForce Now streaming service, 46–47
  - Nintendo Switch development and, 726
  - Tegra3 quad-core processor, 758
  - Xbox development and, 407, 642

Oculus Rift, **741–747**
  - *Beat Saber*, 746
  - Consumer Version I (CV1), 743–744

- DK1 (first developer kit), 743
- DK2 (second developer kit), 743
- *DOOM BFG*, 745
- *The Elder Scrolls V: Skyrim VR*, 746
- *EVE Valkyrie*, 745–746
- Facebook's acquisition of Oculus, 481, 510, 742, 745
- games for Oculus head-mounted displays, 745–746
- history and founding, 741–743
- Luckey, Palmer, and, 741, 742, 745
- Oculus Go, 744
- Oculus Quest, 744–745
- Oculus Rift S, 744
- original prototype, 743
- products, 743–745
- Samsung Gear VR, 743
- tracking hardware and touch controllers, 745

Odyssey. *See* Magnavox Odyssey
Online games, **747–748**
- definition of, 747
- home console games, 747–748
- mainframe games, 747
- web-based games, 748

Ontology, **748–752**
- definition of, 748
- four types of game ontology, 749–750
- game ontology, 748–749
- meta-ontology, 750

Open-source software, **752–754**
- definition of, 752
- examples of, 752–753
- modding cultures and, 753

Oregon Trail, The, **754–756**
- card games, board games, and promotional materials, 754
- fortieth anniversary edition, 756
- gameplay, 754–755
- history and development, 754
- impact and legacy, 754–756
- Minnesota Educational Computing Consortium (MECC) and, 754
- retro handheld game, 755
- start screen, *755*

Outsourcing, **756–757**
- definition of, 756
- history of, 756–757
- prevalence of, 757

OUYA, **757–758**
- acquired and shut down by Razer, 758
- developer's kit with, 757–758
- history and development, 757

  price, 757
  processor and technical specifications, 758
  user community, 758
Overwatch, **758–760**
  gameplay, 758–759
  history and development, 759
  Overwatch League and esports, 12, 144, 759–760
  reception and sales, 759
Overwatch League, 12, 144, 759–760

Packaging, **761–763**
  components of, 761
  for console-based games, 761
  digital games and, 762
  early video game packaging, 761
  Electronic Arts packaging, 762
  for home computer games, 761
  Infocom packaging and props, 512–513, 761, 1033
  for limited edition and collector's games, 762
  reduction of, 762
Pac-Man, **763–765**
  animated series adaptation of, 13
  artificial intelligence and, 68
  Atari, Inc. v. North American Philips Consumer Electronics Corp. and, 77–78
  cabinet art, 49
  crash of 1983, 224
  Easter egg in, 764
  gameplay, 763
  history and development, 763
  in history of arcade games, 51, 52
  impact and legacy of, 506, 764
  Iwatani, Toru, and, 682, 763
  merchandising and, 617
  Midway Games and, 649
  Ms. Pac-Man, 205, 602, 841
  Namco and, 682
  PacManhattan (ubiquitous game), 1063
  reception and sales, 763
  sequels, 52, 763
  visual rewards, 107
Pajitnov, Alexey, 48, 309, 591, 1029, 1031, 1164
Pan European Game Information (PEGI) system, **765–766**
  content descriptors, 765
  history of, 765
  icons, *766*
  organizational structure of, 765–766
  PEGI Online, 766
  suitability by age, 765

Paradox Interactive, **766–768**
  acquisitions, 767
  history of, 767
  history-themed strategy games, 766–767
  partnerships, 767
  publishing and distributions, 767
Passage, 319, 631, 685, 868–869, 892, 987
Patent #2,455,992, **768–769**
  "first" video game and, 347–348, 466, 768
  introductory abstract, 768
Pause function. *See* Help function
PC bangs, **769–770**
  controversy, 770
  cost, 769
  cultural significance of, 769
  definition of, 769
  economic significance of, 769–770
  history of, 769
  sales, 769
PC-Engine. *See* NEC PC-Engine/TurboGrafx-16
PEGI. *See* Pan European Game Information (PEGI) system
Performance, **770–772**
  definition of "digital performance," 770
  game studies and, 771
  interactive media and, 771
Peripherals, **772–773**
  controllers, 772
  for data storage, 772–773
  definition of, 772
  first video game peripheral, 98
  PediSedate (medical use), 773
  screens, 772
  speakers, 772
Persistent games, **773–774**
  definition of, 773
  persistent-state virtual world (PSW), 773
  profitability of, 774
  qualities of, 773–774
  types of, 773
Pervasive games, **774–776**
  alternate reality games, 775
  augmented games, 775
  definition of, 774
  features of, 774, 775–776
  history of, 774–775
  location-based games, 775
  MMORPGs, 775
  scavenger hunting, 774–775

Phenomenology, **776–780**
  aim of, 778
  definition of, 776
  definition of "phenomenology of video games," 777
  first-person shooters and, 778–779
  game classifications and, 778
  history of, 776–777
  immersion and, 777
  phenomenological reduction, 778
  transcendental phenomenologies, 778–779
Philips CD-i, **780–782**
  cutscenes from CD-i games, 781
  game library, 781
  history and development, 780–781, 948
  interactive movies for, 515
  models, 781
  reception and sales, 781
  Zelda-themed games for, 572, 697, 781
Philosophical critique of games. *See* Games, philosophical critique of
Physical health. *See* Health (physical)
Physics engine, 369, 451, 784, 830, 1080
Pinball
  Atari and, 76, 416–417
  Bally and, 102, 103
  first pinball with electromechanical flippers, 521
  first pinball-style game, 416
  first video pinball game, 50
  in history of arcade games, 51, 54
  in history of arcades, 55, 56–57, 58
  in history of electromechanical games, 289, 290
  machines, *56*, 57
  Midway Games and, 649
  Midway Gaming Classic and, 650–651
  parlors, 57, 58
  Scramble, 1090–1091
  Williams (company) and, 1141–1142
Piracy in China, 169–170, 171, **782–783**
  chips used in, 782
  of console design, 783
  digital piracy, 783
  game hardware and emulators, 782–783
  history of, 782
Pitfall!, 10, 76, 204, 378, 405, 701, 761, 921, 1042
Pitts, Bill, 361, 466, 589
Platforms, **783–785**
  Atari VCS 2600, 784
  definition of, 783–784
  multimedia platforms, 784

  platform studies, 784
  software platforms, 784
  Wii's motion controller, 784
Play, **785–787**
  definitions of, 785–787
  games and, 785–787
  jeu, 785, 786
  player's mindset and, 786–787
  rules and, 786
Play Meter magazine, **787–788**
  annual directory issue, 788
  features and target audience, 787–788
  history and founding, 787
Player character. *See* Avatars
Playmore. *See* SNK (Shin Nihon Kikaku) Playmore
Playrix, **788–790**
  Fishdom, 788–789
  Gardenscapes, 788
  history and founding, 788
  Homescapes, 789
  success of, 789
  Township, 788, 789
PlayStation. *See* Sony PlayStation
PlayStation Eye, 90, 408, 410, 501, 669, 951–952, 955, 957, 977, 1040
PlayStation Move, 90, 113, 211, 212, 215, 216, 408, 410, 501, 669, 952, 955, 957, 977, 1040
Pokémon GO, **790–792**
  download statistics, 790
  gameplay, 790
  impact on console games, 790–791
  Pokémon as in-game resources, 790
  reception and revenue, 791
Poland, **792–796**
  Amiga-game development, 795
  educational software development, 794–795
  first Polish games, 794
  Fortnite, 796
  games for 8-bit Atari computers, 795
  indie game development, 796
  localized games, 796
  PC-game development, 795–796
  People Can Fly (later Epic Games Poland), 796
  Polish-language text adventure games, 794
  Robbo, 795
  Techland, 796
  The Witcher series, 796
  ZX Spectrum games, 794–795
PONG, **797–798**

  - Alcorn, Allan, and, 74, 495, 797–798
  - arcade cabinet, 74
  - Atari and, 73, 74
  - "broken *PONG*" story, 797–798
  - Bushnell, Nolan, and, 127, 128, 373, 466–467
  - casual game, 797
  - Dabney, Ted, and, 798
  - "first" video game, 348
  - history and development, 797
  - in history of arcade games, 49–50
  - in history of ball-and-paddle games, 101–102
  - impact and legacy, 797, 798
  - Integrated circuit (IC) and, 102, 127
  - *PONG Doubles*, 218, 798
  - *Quadrapong*, 798
  - sound in, 960
- Poole, Steven, 442, 626
- *Portal* series, **798–801**
  - female protagonist, 800
  - gameplay, 798–799
  - history and development, 799
  - in history of shooting games, 916
  - impact and legacy, 800–801
  - interface, 799
  - *Portal 2*, 799
  - spatial navigation, 687
- Portugal, **801–803**
  - early game development, 801–802
  - Lisbon World Exposition (Expo '98), 802
  - *Paradise Café*, 802
  - *Under Siege*, 802
  - *Undercover*, 802
  - YDreams, 802
- Preservation, **803–805**
  - archival preservation, 803
  - context and, 803
  - digital aspects of, 804
  - material aspects of, 803–804
  - "preservation through use," 804
- Procedural generation, **805–809**
  - in *Advanced Dungeons & Dragons: Slayer*, 806
  - in *Captive*, 806
  - challenge of compression, 807–808
  - in *Civilization* series, 806
  - definition of, 805
  - in *Dwarf Fortress*, 807–808
  - in *The Elder Scrolls* series, 288, 806–807
  - in *Elite*, 805

- fractal landscapes, 805–806
- in *Fuel*, 807–808
- handcrafted content and, 806–807
- history of, 805–806
- in *Rogue*, 805
- in rogue-like games, 842
- in *Stellar Track*, 805
- in *Virtual Hydlide*, 806

Procedural rhetoric, **809–811**
- Aristotelian enthymeme, 809
- Bogost, Ian, on, 24, 43–44, 809–810, 826
- criticism of, 810
- definition of, 809
- early simulation games and, 810
- *Grand Theft Auto: San Andreas* and, 809–810
- immersive realism games and, 810
- *Kaboom!* and, 810
- *McDonald's Game* and, 810
- procedural literacy and, 810

Psychodynamics, **811–815**
- cybernetic psychoanalysis, 812
- definition of, 811
- Freud, Sigmund, on, 811, 814
- the imaginary, 812
- immersion, 812–813
- Lacan, Jacques, on, 811, 812, 813
- phases of video game playing, 811–812
- transference, 812–813

Psychological research on video games, **815–818**
- Badura, Albert, and, 815
- cultivation theory, 815–816
- history of, 815–816
- media practice model, 816
- research on video games and violence, 815
- uses and gratifications approach, 815
- video games as mental health tools, 815

*Q*bert*, **819–820**
- axonometric projections, 1170
- gameplay, 819
- history and development, 819
- impact and legacy, 819–820
- pinball game, 819
- *Q*Bert Rebooted*, 820
- *Q*bert's Qubes*, 819–820

Qix, **820–821**
- first "drawing game," 820
- gameplay, 820

  launch, 820
  Qix II Tournament, 821
  reception, 820–821
  Super Qix, 821
  Taito and, 820
  Volfied/Ultimate Qix, 821
Quake engine, 40, 370, 380, 442, 493, 1072, 1081
Quake series
  artificial intelligence and, 736
  Games Done Quick and, 394
  id Software and, 493, 664
  in-game esports and performances, 304, 493
  Quake (1996), 493
  Quake III: Arena, 66, 136, 165, 493, 582
  Quake II, 493
  time in, 1042
Quick time events (QTEs), **821–822**
  in *Asura's Wrath*, 822
  criticism of, 822
  definition of, 821
  in *Die Hard Arcade*, 822
  in *Dragon's Lair*, 821
  gameplay and, 821
  in *God of War III*, 822
  history of, 821–822
  in *Resident Evil 6*, 822
  in *Shenmue*, 822
Quraish, **822–823**
  Afkar Media and, 822, 1023
  first Arab/Muslim strategy game, 823, 1023
  gameplay, 823
  history and development, 822–823

Race, **824–829**
  Donkey Kong and, 826
  game zombies and, 826–827
  Heir and Sheffield on, 825–827
  heroic whiteness, 825
  must-play characters and, 824–828
  progressive and regressive discourses, 824–825
  racial and ethnic displacement, 825–826
  racial Other, 825, 827
  Resident Evil series and, 827
  structural racism, 825
  World of Warcraft and, 826
Racing games, **829–831**
  arcade games, 829
  casual racers, 831

  - console games, 829–830
  - *Daytona USA* series, 829
  - definition and characteristics of, 829
  - *Enduro*, 829
  - *Final Lap*, 830
  - *Gran Trak* series, 829
  - *Gran Turismo*, 829
  - *Hard Drivin'*, 830
  - history of, 829–830
  - *Indy 800*, 829
  - *Out Run*, 829–830
  - *Pole Position*, 829
  - racing simulators, 830–831
  - *Revs*, 829
  - *Ridge Racer*, 829
  - *SEGA Rally* series, 829
  - three-dimensional graphics and, 830
  - *Turbo*, 829
  - *Virtua Racing*, 829
- Reading video game imagery, **831–832**
  - game elements, 832
  - point of view and, 832
  - spaces of game world, 831–832
- Reception theory, **832–835**
  - actual reader approaches, 833–834
  - casual games and, 834
  - characteristics of, 832–833
  - Chicago School, 833–834
  - cultural studies, 834
  - functionalism and, 834
  - history of, 832
  - implied reader approaches, 833
- *Red Dead Redemption* series, 217, 481, 562, 737, 866, 867, 1115
- Reddy, Siobhan, **835–836**
  - awards, 835–836
  - *Little Big Planet*, 835
  - at Media Molecule, 835
  - *Tearaway: Unfolded*, 835
- Regionalization. *See* Localization
- Remediation, **836–840**
  - arcade games and, 836
  - canonization of video games and, 839
  - console games and, 836–837
  - cutscenes and, 836–838
  - definition of, 836
  - embedded narrative and, 838
  - hypermediacy and, 836
  - interactive movies and, 837

  laserdisc games and, 836–837
  medial transparency and, 836
  prerecorded content and, 836–837
  real-time rendering and, 838
  television and, 838–839
  3-D rendering and, 837–838
  video games as object of, 839
Replay and repetition, **840–843**
  in arcade games, 841–842
  in home video games, 842
  incentives for, 842
  navigation of levels learned through, 841–842
  play mechanics learned through, 841
  replay value, 842
  rogue-like games and, 842
  skills learned through, 841
  speedruns and, 842
  temporal navigation/manipulation games and, 842
  in traditional games, 841
RePlay magazine, **843–844**
  crash of 1983, 844
  features and areas of interest, 843–844
  history and founding, 843
  special editions, 843–844
  subscription base, 843
  target audience, 843
Representations of video games in Hollywood cinema, **844–849**
  The Bishop of Battle, 846–847
  The Black Hole, 846
  film adaptations of video games, 848
  Grandma's Boy, 848
  horror films, 848–849
  influence of visual style of video games on film, 849
  Joysticks, 847
  The Karate Kid, 847
  The Lawnmower Man, 848
  The Princess Bride, 847
  scholarship on, 849
  Star Wars, 845
  Starfighter, 846–847
  Toys, 847–848
  Tron, 844–845, 846
  WarGames, 846
Resident Evil series, **850–852**
  Capcom and, 141, 848, 1097, 1098
  film series, 342, 848, 1097, 1098
  gameplay, 850–851
  in history of survival horror games, 1014–1015

  impact and legacy, 852
  limited saves, 890
  packaging, *851*
  remediation and, 837, 839
  Resident Evil (1996), 210, 850
  Resident Evil: Code: Veronica, 851
  Resident Evil: Outbreak, 852
  Resident Evil: Survivor, 852
  Resident Evil 5, 141, 825, 827, 851, 852, 1016
  Resident Evil 4, 141, 210, 736, 851, 1016
  Resident Evil 7: Biohazard, 141, 158, 212, 852, 957, 1016
  Resident Evil 6, 141, 822
  Resident Evil 2, 851–852
  Resident Evil Zero, 210, 852
  save game functionality in, 890
Resolution, **852–854**
  color resolution, 853
  definition of, 852
  geometric resolution, 853
  spatial resolution, 852–853
Resource management games, **854–855**
  Crusader Kings II, 855
  definition of, 854
  gameplay, 854–855
  nature of resources, 855
  open-world first-person shooters, 854
  The Rise of Industry, 854
  role of resource management in, 855
  strategy games, 854
  Sunless Seas, 855
  survival games, 854
  tycoon games, 854
Resurrection. *See* Death and resurrection
Retrogaming, **855–857**
  causes of subculture of, 856
  commercialism and, 856–857
  definition and characteristics of, 855–856
  definition of, 855
  demakes, 855–856
  nostalgia and, 856
  remakes, 855–856
Rhetoric, **857–859**
  Aristotelian rhetoric, 858–859
  definition of, 857
  dialectical analysis, 857, 858
  discourse of games, 857
  game studies and, 857–859
  game work analysis, 858

  - power structures and, 859
  - rhetorical criticism, 857
- Rhythm and dance games, **859–862**
  - *Beatmania*, 860
  - *Dance Dance Revolution*, 860, 861
  - definition of, 859
  - game interfaces, 861
  - gestural interfaces, 861
  - *Guitar Hero*, 861
  - *GuitarFreaks*, 860
  - motion-capture technology, 861
  - Nintendo Power Pad floor mat, 860
  - *PaRappa the Rapper*, 860
  - peripheral-led music gaming, 860
  - rhythm-action genre and, 859
  - *Simon*, 859–860, 861
  - *Touch Me*, 859
  - virtual reality technology, 861
- *Rip Off*, 51, 173, 219, 400, 1087, 1088
- Ritual, **862–864**
  - formality and repetition, 863–864
  - interactivity and, 862
  - performance and, 862–863
  - purpose of, 863
  - storytelling and, 862
- *Riven*, **864–866**
  - Cyan Worlds and, 234–235
  - gameplay, 864–865
  - history and development, 234–235
  - huts of the villagers on Jungle Island, *865*
  - impact and legacy, 864, 865
  - player control, 67
  - reception and sales, 235
- *River Raid*, 10, 411, 913
- Robinett, Warren, 16–17, 86, 277
- Rocket jumping, 125, 351
- Rockstar Games, **866–868**
  - *Grand Theft Auto* series, 436, 437, 866, 867
  - Hot Coffee mod controversy, 866–867
  - Houser, Sam and Dan (founders), 480, 481, 866
  - published games, 866
  - *Red Dead Redemption* series, 217, 481, 562, 737, 866, 867, 1115
  - visual aesthetics and gameplay, 704
- *Rogue*, 19, 842, 870
- Rohrer, Jason, **868–869**
  - *The Castle Doctrine*, 868
  - *Diamond Trust of London*, 868
  - experimental games, 319

  Gravitation, 319, 868
  Inside a Star-Filled Sky, 868
  Passage, 868–869
  voluntary simplicity asceticism of, 868
  See also Passage
Role-playing games (RPGs), **869–873**
  Akalabeth, 870
  Arcadian Atlas, *871*
  computer games, 870
  console games, 870
  definition and features of, 869–870, 871
  Diablo, 871, 872
  experience levels and points, 869–870
  Mass Effect, 871–872
  multiplayer games, 870–871, 872
  single-player games, 870, 871, 872
  tabletop games, 869
  Three-Way (Threefold) Model, 871–872
  World of Warcraft, *870*, 871
  See also Ultima series
Romania, **873–875**
  console clones, 873
  current gaming culture, 874
  fall of communism, 873
  game piracy, 873
  video game industry, 874
Romero, Brenda, **875–876**
  academic career, 875
  awards and honors, 875, 876
  console *Dungeons & Dragons* games, 875
  Loot Drop cofounder, 875
  Playboy: The Mansion, 875
  published written works, 875
  tabletop game designs, 875–876
  Wizardry 8, 875
Romero, George, 141, 1014, 1065
Romero, John, 263, 277, 492, 493, 525, 564, 875
Rosenthal, Larry, 172–173, 1086, 1089–1091, 1092
Ross, Bonnie, **876–877**
  343 Industries founder, 876–877
  awards and honors, 877
  early career and education, 876
  Halo series, 876–877
  at Microsoft, 877
  NBA Full Court Press, 876
Rotoscoping, 41, 356, 440
RPGs. *See* Role-playing games
Rules, **877–880**

  - constitutive and regulative rules, 878–879
  - free play and, 877–878
  - as guidelines, 877
  - Huizinga, Johan, on, 878–879
  - magic circle of play and, 878
  - technological rules, 879

Russell, Stephen, 202, 348, 506, 980
Russia, **880–886**
  - Buka Entertainment, 882–883
  - foreign imports, 881
  - game players in, 883–885
  - Gamos, 882
  - IT Territory, 883
  - MMOGs, 881
  - mobile and social games, 880–881, 883
  - national history and video games, 881–882
  - newer game development companies, 883
  - Nikita Online, 882
  - *Perestroika*, 880
  - Soviet era, 880
  - *Tetris*, 880
  - video game production, 882–883

Salen, Katie, 27, 108, 363–364, 584, 785, 786
Santiago, Kellee, **887–888**
  - early life and education, 887
  - at Google, 887
  - at OUYA, 887
  - at thatgamecompany, 887, 1037

Saturn. *See* SEGA Saturn
Saudi Arabia, **888**
  - *Al Rekaz (Unearthed: Trail of Ibn Battuta)*, 888
  - *Badiya: Desert Survival*, 888
  - *Clash of Clans*, 888
  - gaming and industry statistics, 888
  - Lumba, 888
  - Semaphore Lab, 888
  - *Tribal Rivals*, 888

Save function, **888–890**
  - arcade games and, 888–889
  - autosave, 890
  - console games and, 889–890
  - history of, 888–890
  - intentional limitations on, 890
  - purpose of, 888

Scepter of Goth, **890–891**
  - gameplay, 891
  - history and development, 890–891

- in history of mutiuser domains (MUDs), 670
- impact and legacy, 891
- Klietz, Alan E., and, 670, 890–891

Scrolling, **891–893**
- computer mice and, 892
- eight-way scrolling, 892
- first home computer game with scrolling, 892
- first video game to feature scrolling, 892
- patents for, 892, 893
- *Super Bug*, 892
- on touchscreen devices, 892–893
- two-way scrolling, 892
- *Ultima* and, 892

Second generation of consoles (1976–84), 404–405
- Atari 5200, 78, 405
- Atari VCS 2600, 404–405, 506
- audio in, 673
- ball-and-paddle games and, 102
- cartridges and, 404
- chip technology in, 95
- ColecoVision, 186, 405
- Fairchild/Zircon Channel F, 322, 404
- GCE/Milton Bradley Vectrex, 399
- graphics in, 41
- Mattel Intellivision, 405, 610
- *See also* Generations of technology; *individual consoles*

SEGA, **893–897**
- arcade games, 894
- *Astron Belt*, 894
- console games and market, 894–895
- crash of 1983, 894
- early coin-operated games, 894
- handheld console, 895
- history and founding, 893–894
- *Jet Rocket*, 894
- *Periscope*, 894
- release of SEGA Channel, 896
- release of SEGA Dreamcast, 896–897
- release of SEGA Genesis/SEGA Mega Drive, 895
- release of SEGA Master System/SEGA Mark III, 895
- release of SEGA Saturn, 896
- *Rifleman*, 894
- Rosen, David, and, 893–894
- *Sonic the Hedgehog* series, 895
- *SubRoc-3D*, 894

SEGA CD/Mega-CD, **897–899**
- bundled games, 898
- full-motion video (FMV) and, 897

- game library, 898–899
- graphics and data advantages, 897–898
- hardware and technical specifications, 898
- history and development, 897
- price, 897, 898
- sales, 899
- third-party support for, 898

SEGA Dreamcast, **899–901**
- game library, 900
- history and development, 899
- peripherals, 899–900
- reception and sales, 900
- sixth-generation console, 406, 471, 508, 899
- technical specifications, 899
- Visual Memory Unit (VMU), 900

SEGA Game Gear, **901–902**
- “capacitor plague,” 902
- game library, 901
- history and development, 901
- homebrew activity for, 902
- reception and sales, 901–902
- technical specifications, 901

SEGA Genesis/SEGA Mega Drive, **902–904**
- accessories, 904
- fourth-generation console, 405–406, 508, 902, 904
- launch, 902
- reception and sales, 903
- *Sonic the Hedgehog* and, 903–904
- technical specifications, 903
- variants and derivations, 904

SEGA Master System/SEGA Mark III, **904–906**
- accessories, 905
- cartridge games, 905
- history and development, 904–905
- lack of third-party support, 905–906
- launch, 904
- price, 905
- reception and sales, 905
- SEGA Card, 905
- SEGAScope 3-D Glasses, 905

SEGA Mega Drive. *See* SEGA Genesis/SEGA Mega Drive

SEGA Saturn, **906–907**
- fifth-generation console, 406, 906
- game library, 907
- history and development, 906
- launch, 906, 907
- price, 907
- reception and sales, 907

  technical specifications, 906–907
Serious games, **907–909**
  Darfur Is Dying, 908
  definitions of, 907–908
  history of the term, 908
  Re-Mission, 908
  research on, 908–909
7800. *See* Atari 7800 ProSystem
Seventh generation of consoles (2005–13), 407–408
  casual games and, 148
  energy consumption of, 302, 1017
  extended duration of, 408
  Microsoft Xbox 360, 407–408, 471, 508, 639
  Nintendo Wii, 408, 471, 508, 729
  online services, 148, 407–408
  Sony PlayStation 3, 408, 471, 508, 953
  See also Generations of technology; *individual consoles*
Shareware games, **909–913**
  Apogee Software, 911–912
  Beast, 911
  definition of, 910
  distribution of, 911
  early business programs of, 910
  Epic MegaGames, 911–912
  free (demo) versions, 910
  freeware compared with, 910
  full-service shareware publishers, 911–912
  history of, 909–910
  registered (paid) versions, 910
  Scorched Earth, 911
  Sopwith, 910–911
  Wolfenstein 3D, 912
Shaw, Carol, **913–914**
  at Activision, 913
  at Atari, 913
  awards, 913
  early years and education, 913
  Happy Trails, 913
  Polo, 913
  River Raid, 913
  3-D Tic-Tac-Toe, 913
Shin Nihon Kikaku. *See* SNK (Shin Nihon Kikaku) Playmore
Shooting games, **914–917**
  aiming, 916
  challenges and skills, 915–916
  definition of, 914
  early video games, 916–917
  first-person perspective games, 915

  history of, 916–917
  id Software and, 917
  peripherals, 917
  player's perspective, 914–915
  third-person perspective games, 915
  three-dimensional graphics, 917
  timing, 916
Sierra Entertainment, **917–920**
  acquired by Vivendi, 919
  acquisitions, 918
  Hi-Res Adventure series, 918
  history and founding, 917–918
  impact and legacy, 919
  King's Quest, 917, 918, 919
  name change to Sierra Online, 918
  online gaming, 918
  sale to CUC International, 919
  title revivals under Activision, 919
  Williams, Ken, and, 918, 1142
  Williams, Roberta, and, 918, 1142–1143
Silent film, **920–922**
  adventure genre, 921
  aesthetic awareness of the frame, 920–921
  early video games and, 920–921
  sight gags, 921
  slapstick comedy, 921
  video game design inspired by, 921–922
Silicon Knights v. Epic Games, **922–923**
  background and case details, 922–923
  decision and damages, 923
Sim series, **923–928**
  consumerism and, 926
  creation of emergence, 926–927
  educational uses, 924–925
  failure in, 321
  gameplay, 923–924, 926
  as god game, 429, 430, 925
  Green movement and, 302, 1017
  history and development, 924
  impact and legacy, 924, 925–926
  launch of *SimCity*, 924
  in list of ten most important digital games of all time, 335
  maps and, 596
  Maxis Software and, 611, 612–613
  narrative and, 927
  players' experience, 814
  SimAnt, 612, 925, 929, 932, 1155
  SimCity BuildIt, 927

  - *SimCity 4*, 924
  - *SimCity Social*, 924
  - *SimCity Societies*, 613, 925, 927
  - *SimCity 3000*, 924
  - *SimCity 2000*, 924, 976
  - *SimCopter*, 612, 925
  - *SimEarth*, 302, 612, 693, 925, 932, 1017, 1155
  - Sims Studio, 613, 927
  - as "software toys," 926, 1122
  - spin-off titles, 925
  - time in, 1042
  - unit operations, 1070–1071
  - Wright, Will, and, 923, 925–927, 1155

Sims, The series, **928–932**
  - Family Album feature, 929
  - gameplay, 928
  - list of games and ancillary releases, 930–931
  - machinima productions and, 929
  - player-created content, 929
  - same-sex relations, 929
  - screenshot, *928*
  - *The Sims* (2000), 930
  - *The Sims 2*, 550, 736, 925, 930
  - *The Sims 3*, 178, 381, 613, 630, 631, 925, 927, 929, 930
  - *The Sims 4*, 178, 381, 925, 928, 929, 930–931
  - *The Sims Resource* (fansite), 929
  - Wright, Will, and, 928

Simulation games, **932–937**
  - *Black & White* series, 933
  - *Civilization*, 932
  - definition of, 932
  - flight and vehicle simulation games, 933
  - history of, 932
  - influence of cybernetics and systems theory on, 933–934
  - *Kafkamesto*, 936
  - Molyneux, Peter, and, 933
  - narrative-based scenario simulations, 934–935
  - "procedural rhetoric" of simulation, 936
  - *Real Lives 2004*, 936
  - *Second Life*, 935
  - *September 12th*, 936
  - serious games and operational games, 935
  - *The Sims*, 932
  - *Stellar Track*, 932
  - as subset of strategy games, 933
  - *Utopia*, 932
  - Wright, Will, and, 932–933

Singapore, **937–939**

  game industry development, 937–938
  gaming and industry statistics, 937
  global game companies, 938
  government involvement in game sector, 937–939
  independent game development, 939
  Media 21 (government policy), 937, 938
Sixth generation of consoles (1998–2004), 406–407
  in Mexico, 638–639
  Microsoft Xbox, 407, 471, 641
  Nintendo GameCube, 407, 471, 721
  SEGA Dreamcast, 406, 471, 508, 899
  Sony PlayStation 2, 406–407, 471, 508
  XaviXPORT, 407
  See also Generations of technology; *individual consoles*
Skelly, Tim, 172, 173, 219
SNES. *See* Super Nintendo Entertainment System (SNES)/Super Famicom
SNK (Shin Nihon Kikaku) Playmore, **939–941**
  bankruptcy, 940–941
  history and founding, 939–940
  Kawasaki, Eikichi, and, 939, 940–941
  Neo•Geo, 694–695, 940
  sale to Aruze, 940
Social media, **941–945**
  cyber-utopianism and, 944–945
  discussion platforms, 943–944
  social networking sites (SNS), 942
  transparency and toxicity, 943–944
  Twitch, 943
  video games and, 942–944
  Web 2.0, 941–942
  YouTube, 943
  See also Facebook; YouTube
Software toys, 926, 1122
Sony Corporation, **945–947**
  history and founding, 945–946
  Ibuka, Masaru, and, 945, 946
  Morita, Akio, and, 945, 946
  notable technologies and products, 946–947
  record player needles manufactured by, 946
  TR-55 (radio), 946
Sony PlayStation, **947–950**
  fifth-generation console, 406
  history and development, 947–949
  naming of, 948
  price, 45
  reception and sales, 949
  three-dimensional filled-polygon-based games, 949
Sony PlayStation 2, **950–953**

  - add-ons and peripherals, 951–952
  - DVD capability, 951
  - game library, 951
  - processor, 951
  - reception and sales, 950–951, 952
  - sixth-generation console, 406–407, 471, 508
- Sony PlayStation 3, **953–955**
  - Blu-ray and DVD capability, 954
  - controllers, 954, 955
  - game library, 954–955
  - as multimedia computer, 954
  - price, 953
  - processor and technical specifications, 953–954
  - reception and sales, 953
  - seventh-generation console, 408, 471, 508, 953
- Sony PlayStation 4, **955–958**
  - controller, 956–957
  - eighth-generation console, 410, 508, 955
  - game library, 957
  - history and development, 956
  - launch, reception, and sales, 956
  - price, 957
  - technical specifications, 957
- *Sony v. Bleem*, **958–959**
  - background and case details, 958
  - ruling, 958–959
- Sound, **959–963**
  - ecological and emphatic sounds, 960
  - economic and technical constraints, 959
  - in first-person shooting games, 961
  - in handheld strategy games, 961
  - impact of genre on, 961
  - interactivity and, 961–962
  - market demands and demographics, 960
  - in *PONG*, 960
  - in role-playing games, 961
  - sonic aesthetic of video games, 959–963
  - in *Tetris*, 960
- Sound technology, **963–966**
  - analog sound, 963–964
  - dedicated sound chips, 964–965
  - digital audio, 964–965
  - Musical Instrument Digital Interface (MIDI) protocol, 965
  - programmable sound generators (PSGs), 964
  - pulse width modulation, 964
  - in 16-bit era, 964–965
  - surround capability, 965
  - wavetable synthesis, 965

South Africa, **966–972**
  Balisti Studios, 970–971
  Broforce, 968–969
  The Brotherhood, 969–970
  Celestial Games, 966
  Free Lives, 968–969
  Fuzzy Logic, 968
  Game.Dev (game community), 966, 969
  I-Imagine Interactive, 966
  Lighthouse Games, 968
  Luma Arcade, 28–29, 967, 969
  Make Games South Africa (MGSA), 969, 971
  Nyamakop, 970
  PaleBlue XYZ, 971
  QCF Design, 968
  Red Dot Lab, 968
  Red Splat Games, 970
  RetroEpic, 967
  Rising Phoenix Games, 968
  Runestorm, 966
  Sea Monster, 968
  Smallfry Mobile, 966–967
  Tasty Poison, 968
  Team Lazerbeam, 970
South America. *See* Argentina; Brazil; Chile; Colombia; Latin America; Uruguay
South Korea, **972–973**
  Crazyracing Kartrider, 972
  esports, 11, 305, 307, 769, 973
  gaming and industry statistics, 972–973
  Korea Game Industry Agency, 972
  online gaming and games in, 972–973
Space (narrative), **973–975**
  definition of, 973–974
  exploration of visual space by players, 974
  mental maps and, 974
  narrative sequences, 974
Space (visual), **975–977**
  definition of, 975
  dimensionality, 976
  game spaces overlaid over physical spaces, 977
  mixed dimensionality, 976
  non-Euclidean space, 976–977
  off-screen spaces, 975–976
  on-screen spaces, 975
Space Invaders, **977–980**
  aiming, 916
  for Atari VCS 2600, 85, 223
  first “killer app,” 980

  game genealogies and, 374
  gameplay, 979
  golden era of arcade video games and, 51
  history and development, 977–978
  impact and legacy, 978, 979–980
  influence of science fiction on, 343
  in Italy, 526
  masculinity and, 602
  Midway Games and, 649
  Nishikado, Toshihiro, and, 977
  reception and sales, 978
  screenshot, *978*
  soundtrack, 673
  “Space Invader wrist,” 458
  sprite graphics, 980
  visual space, 976, 977
  yen coins and, 978–979
Space Wars, 104, 172, 348, 400, 541, 981, 1086, 1088, 1090
Spacewar!, 466, **980–981**
  Computer Space and, 49, 73, 202, 348, 466, 589, 981
  Galaxy Game and, 348, 361, 466, 589, 981
  gameplay, 981
  history and development, 980–981
  in history of first video games, 348
  in history of mainframe games, 589
  impact and legacy, 981
  Russell, Stephen, and, 202, 348, 506, 980
Spain, **981–983**
  Akaoni Studio, 982
  Bit Managers, 982
  collapse of video game industry, 982
  Commandos, 982
  Dinamic, 982
  Gaelco, 982
  Golden age of Spanish software, 981–982
  Menéndez, Francisco “Paco,” 982
  Mercury Steam Studio, 982
Spatial navigation. *See* Navigation (spatial)
Spector, Warren, **983–984**
  at Disney Interactive Studios, 984
  education and early career, 983
  influence of silent film on work of, 920, 922
  notable game credits, 983–984
  at Otherside Entertainment, 984
  at *Space Gamer Magazine*, 983
  Toon, 983
  at TSR Inc., 983
Speedruns, **984–985**

  "beating" a game and, 107
  with classic games, 984–985
  with contemporary games, 985
  definition of, 984
  game modifications and, 984–985
  Games Done Quick, 394–395
  Let's Play videos, 575
  Mario Kart series and, 599
  metagames and, 622
  NES games and, 718
  tool-assisted superplay and, 1045

Spirituality, **985–988**
  as academic study, 985
  computer technology and self-transcendence, 985–986
  definition of, 985
  games to facilitate meditation and relaxation, 987
  in-game proleptic moments and, 986–987
  Populous and, 986
  Ultima IV: Quest of the Avatar and, 986
  video games and spiritual experience, 986
  Wisdom Tree Games and, 986

Spore series, 184, 253, 292, 381, 430, 613, 676, 932–933, 1155

Sports games, **989–993**
  action simulations, 990–991
  card-collecting modes, 991
  definition of, 989
  EA Sports, 989, 991–992
  early sports games, 989
  extreme simulations, 990
  history of, 989–990
  home console games, 989
  licenses and licensing deals, 991–992
  management simulations, 990
  text sims, 990
  2K Sports, 989–990, 991–992
  types of, 990–991
  Wii Sports, 990

Square Enix, **993–994**
  acquisitions and name change, 993–994
  Final Fantasy: The Spirits Within (film), 993, 1098
  history and founding, 993
  notable game titles, 993, 994
  See also Call of Duty series; *Dragon Quest* series; *Final Fantasy* series; *Tomb Raider* series

StarCraft, **994–997**
  as esport, 996
  gameplay, 994–996
  history and development, 994

  impact and legacy, 995–997
  StarCraft II, 995
Starhawk, 51, 172–173, 831, 1086, 1088
Stealth games, **997–999**
  action-adventures series, 998
  Assassin's Creed, 999
  Castle Wolfenstein, 997
  definition of, 997
  genre-bending stealth games, 998–999
  history of, 997–998
  immersive sim genre, 998
  Metal Gear series, 625, 997–998, 999
  monster franchises, 999
  movie and comic book tie-in series, 998
  role-playing series, 998
  Splinter Cell, 998
  survival horror genre, 998
Steam (portal), **999–1000**
  digital library, 1000
  features and services, 999
  history and development, 1000
  Steam Machines, 1000
  Steamworks (software development tool), 999
Strategy games, **1000–1003**
  artificial intelligence and, 1003
  definition of, 1000
  emphasis on planning versus motor skills, 1000–1001
  4X subgenre of, 1002
  history of, 1001–1002
  mobile games, 1002–1003
  multiplayer online battle arena games, 1002
  number of players and, 1003
  real-time strategy subgenre of, 1002
  real-world simulations, 1003
  text-based games, 1001
  turn-based versus real-time games, 1003
Streaming, **1003–1004**
  definition of, 1003
  history of the term, 1003–1004
  impact on marketing of digital content, 1004
  of live video game play, 1004
  user requirements for, 1004
Street Fighter II, **1004–1005**
  Capcom and, 140
  Capcom USA v. Data East and, 141–142
  gameplay of, 1004–1005
  in history of console-based games, 206
  in history of fighting games, 338, 339

  Hyper Street Fighter II, 1005
  non-player characters in, 736
  Street Fighter II: Champion Edition, 736, 1005
  Street Fighter II: Hyper Fighting, 1005
  Street Fighter II: The World Warrior, 140, 206, 548, 736, 1004–1005
  Super Street Fighter II: The New Challengers, 1005
  Super Street Fighter II Turbo, 1005
Strong National Museum of Play, **1005–1006**
  American Journal of Play, 1006
  collection, 1006
  exhibits and areas of focus, 1005–1006
  location, 1005
Subcreation, **1006–1007**
  coined by J. R. R. Tolkien, 1006
  definition of, 1006–1007
  study of, 1006–1007
Suicide battery, **1007–1008**
  Capcom games and, 1008
  definition and operation of, 1007–1008
  in Gaelco games, 1008
  removal and replacement, 1008
  in SEGA games, 1008
Sundance, 173, 1086–1087
Super Mario Bros. See Mario Series
Super Nintendo Entertainment System (SNES)/Super Famicom, **1008–1012**
  action and platform games, 1012
  conservative approach toward new technology, 1010–1011
  expansion chips, 1009–1010
  fourth-generation console, 405–406, 508
  game library, 1011–1012
  graphics capabilities, 1010–1011
  history and development, 1008–1009
  launch of, 1008–1009
  reception and sales, 1011
  role-playing games, 1011–1012
  SNES Classic, 1012
  technical specifications of, 1009
Supergiant Games, **1012–1014**
  Bastion, 1013
  Hades, 1013
  history and founding, 1013
  Pyre, 1013
  Rao, Amir, and, 1012–1013
  Simons, Gavin, and, 1012–1013
  Transistor, 1013
Survival horror games, **1014–1017**
  Alone in the Dark, 1014–1015
  characteristics of, 1014

  Clock Tower series, 1016
  Eternal Darkness: Sanity's Requiem, 1016
  Fatal Frame series, 1015–1016
  first-person perspective games, 1016
  Haunting Ground, 1016
  history of, 1014–1016
  horror film tropes in, 1015
  Resident Evil, 1015
  Silent Hill, 1015
  Siren series, 1016
  virtual reality and, 1016
Sustainability, **1017–1018**
  energy use of home consoles, 1017
  energy-efficient systems, 1017
  game content and, 1017–1018
  industry awareness of environmental issues, 1018
Sutton-Smith, Brian, 395, 785, 786, 787
Sweden, **1018–1020**
  early history of digital games, 1018
  financial crisis of 2008, 1019
  game development, 1019–1020
  history of video games, 1018–1019
  independent game developers, 1020
  mobile games, 1019
  online games in, 1019–1020
Switzerland, **1020–1022**
  Amiga-focused games, 1020–1021
  Farming Simulator series, 1021
  institutional legitimization of the video game industry, 1021
  The Last Eichhof, 1021
  Ravage, 1021
  "Smaky" line of computers, 1020–1021
  Swiss Federal Institute of Technology in Zurich (ETH-Zürich), 1020, 1021
  Swiss Game Developers Association (SGDA), 1021–1022
Syria, **1022–1024**
  Under Ash, 1022
  Under Ash II, 1023
  first online Arabic localized game, 1023
  JoyBox, 1023
  Road to Jerusalem, 1023
  Zoya: A Warrior from Palmyra, 1022–1023

Tail Gunner, 173, 1087, 1091–1092
Taito, 530, 893
  acquired by Square Enix, 993
  laserdisc games, 557, 558
  Midway Games and, 649
  Qix, 820

  Space Invaders, 51, 530, 977, 979
  Taito-tronics (New Zealand), 701
  Zuntata (SoundTeam), 678
Television, **1025–1026**
  Black Mirror, 1026
  cathode-ray tube, 1025
  console video game systems and, 1025
  game adaptations of television programs, 1025
  games adapted for, 1025
  The Guild, 1025–1026
Tempest, **1026–1027**
  cabinet art, 1027
  gameplay, 1027
  impact and legacy, 1027
  Operator-Information Display and, 1027
  Skill-Step play system and, 1027
  Theurer, Dave, and, 1026
  Wells-Gardner Color X-Y Display vector monitor and, 1027
Temporal navigation. *See* Navigation (temporal)
Tencent Holdings Ltd., **1027–1029**
  QQ, 1028
  Riot Games acquired by, 1028
  valuation of, 1027–1028
  WeChat, 1028
Tennis for Two, 348, 351, 506, 588–589, 989
Tetris, **1029–1032**
  gameplay, 1029–1031
  history and development, 1029
  impact and legacy, 1031
  in list of most important digital games of all time, 335
  Pajitnov, Alexey, and, 48, 309, 591, 1029, 1031, 1164
  psychological experiments using, 1031
  Tetris effect, 384
Text adventure games, **1032–1035**
  characteristics of, 1032–1033
  graphics technology and, 1034
  history of, 1033–1035
  interactive fiction, 1032, 1033, 1034
  resilience of the genre, 1034–1035
  See also Adventure; Colossal Cave Adventure
Thailand, **1035–1037**
  broadband and computer use, 1036
  consoles, 1035–1036
  esports, 1035, 1036
  game development, 1036
  gaming and industry statistics, 1035
  information and communication technology, 1036
  politics, 1036

  Thai Game Software Industry Association, 1036
thatgamecompany, **1037–1038**
  awards, 1037
  Chen, Jenova, and, 214, 1037
  history and founding, 1037
  Santiago, Kellee, and, 887, 1037
  See also flOw; Flower; Journey
Theurer, Dave, 75, 490, 1026
Third generation of consoles (1983–85), 405
  Atari 7800, 405, 469
  hardware-based scrolling, 405
  Nintendo Entertainment System (NES), 405, 469, 507–508, 718
  SEGA Master System, 405, 469
  See also Generations of technology; *individual consoles*
Thoreau, Henry David. *See Walden, a game*
3-D hardware, **1038–1040**
  anaglyph 3-D hardware and glasses, 1039
  autostereoscopic 3-D technology, 1039–1040
  Nintendo Virtual Boy, 1039
  stereoscopic 3-D process, 1038–1039
  3-D shutter mechanism and glasses, 1038–1039
  Vectrex 3-D Imager, 1038–1039
  virtual reality technology and, 1040
  Zaxxon and, 1038
3DO Interactive Multiplayer, **1040–1042**
  built-in CD-ROM drive, 1040–1041
  Digital Video Module, 1041
  game library, 1041
  Hawkins, Trip, and, 451, 452, 1040, 1041
  history and development, 1040
  interactive movies and, 1041
  reception and sales, 1041
  technical specifications, 1041
Time, **1042–1044**
  countdown timers, 1042
  effect on game state, 1042–1043
  experiential time theories, 1042, 1043–1044
  formalist time theories, 1042–1043
  mapping of play time onto event time, 1042–1043
  MMOs and, 1044
  space and, 1044
Tolkien, J. R. R., 1006, 1068, 1110
Tomb Raider series, 27, 259, 332, 401, 618, 976, 993, 994, 998, 1170
Tony Hawk's Pro Skater series, 11, 207, 849
Tool-assisted superplay (TAS), **1044–1046**
  controller input file, 1045
  definition of "superplay," 1045
  Pokémon Plays Twitch, 1045

  Super Mario Bros. 3 (Morimoto) video and, 1044
  TASBot, 1045
  Tasvideos.org, 1044
Touchscreen games, **1046–1053**
  arcade game touchscreens, 1051–1052
  dedicated gaming devices and, 1048–1050
  early history, 1048
  future of, 1052
  history of touchscreen technology, 1046–1047
  smartphone and tablet touchscreen gaming, 1050–1051
Trade Wars series, 124, 773, 911
Transmedia. *See* Adaptation; Comics; Film; Industry; Merchandising; Silent film; Social media; Subcreation; Television; Video game movies; Video game novels; Video games and literature; Visual novels; World (of a video game)
Treasure Co. Ltd., **1053–1054**
  development process, 1053–1054
  Gaist Crusher God, 1054
  Gunstar Heroes, 1053
  history and founding, 1053
  Ikaruga, 1053
  Mischief Makers, 1053
Tuck, Hugh, 361, 466, 589
TurboGrafx-16. *See* NEC PC-Engine/Turbografx-16
Turkey, **1054–1058**
  "Amateur Level" of game development, 1054–1055
  "Beginner Level" of game development, 1054
  common industry practices, 1057–1058
  The Dagger, 1054–1055
  Dinç Interactive (later Sobee Studios), 1055
  game design and development education, 1056
  game developer associations, 1057
  gaming and industry statistics, 1057–1058
  mobile games, 1056
  Mount and Blade series, 1055–1056
  Piri the Explorer Ship, 1055
  "Professional Level" of game development, 1055–1056
  Recontact Istanbul and *Recontact Istanbul 2*, 1056
  VR/AR laboratories in universities, 1056–1057
Turkle, Sherry, 445, 1122–1123
TV. *See* Television
21st Century Communications and Video Accessibility Act (CVAA), 7
Twin Galaxies, **1058–1061**
  Day, Walter, and, 1059–1060
  future of, 1060–1061
  history and founding, 1059
  name change to Twin Galaxies International, 1060
  purpose of, 1058–1059
  recognition and media coverage of, 1059–1060

  Twin Galaxies National Scoreboard, 1059
  Twin Galaxies' Official Video Game & Pinball Book of World Records, 1060
Twitch, **1061–1062**
  acquisitions, 1061
  esports competitions, 1061–1062
  history and founding, 1061
  naming of, 1061
  TwitchCon, 1061
  user base, 1061
  video game livestreaming, 1061–1062
2K Games
  BioShock series, 114–115, 210
  The Darkness, 14
  Illusion Softworks purchased by, 237
2K Marin, 115
2K Sports, 989–990, 991–992
  ESPN NFL 2K5, 292, 353, 991–992
  MLB 2K series, 992

Ubiquitous games, **1063–1064**
  Can You See Me Now?, 1063
  defining themes and characteristics of, 1063–1064
  I Love Bees, 1063
  PacManhattan, 1063
  Situationists and, 1064
Ubisoft, **1064–1067**
  film-inspired games, 1065
  games adapted from Franco-Belgian comics, 1065
  heroic fantasy and RPGs, 1065
  history and founding, 1064–1065
  Hollywood movie tie-ins, 1065–1066
  hostile takeover attempts, 1066
  integrated production model, 1065
  international expansion, 1065
  "the swirl" logo, 1066
  video game franchises, 1066
  Zombi, 1065
Ultima Online, 70, 176, 398, 399, 431, 471, 606, 620, 1067, 1068–1069, 1137
Ultima series, **1067–1070**
  "Age of Enlightenment" trilogy, 1068
  first home computer game to feature scrolling, 19, 892
  gameplay, 1067–1068
  Garriott, Richard, and, 19, 398–399, 468, 892, 986, 1067, 1068
  history and development, 1067
  in history of RPGs, 870
  impact and success, 1067–1069
  manga based on, 195
  Spector, Warren, and, 983

  - *Ultima* (1980), 19, 398, 892, 1067–1068
  - *Ultima VIII: Pagan*, 399, 1068
  - *Ultima V: Warriors of Destiny*, 398, 1068
  - *Ultima IV: Quest of the Avatar*, 93, 284, 398, 594, 663, 986, 1068
  - *Ultima IX: Ascension*, 399, 1068
  - *Ultima Online* as one of first "big three" MMORPGs, 70, 471, 620
  - *Ultima VII: Serpent Isle*, 983, 1068
  - *Ultima VII: The Black Gate*, 398, 983, 1068
  - *Ultima VI: The False Prophet*, 398, 983, 1068
  - *Ultima III: Exodus*, 398, 1068
  - *Ultima II: Revenge of the Enchantress*, 398, 919, 1068
- Unit operations, **1070–1072**
  - definition of, 1070
  - *DOOM* and, 1072
  - first-person shooting game engines and, 1072
  - *Grand Theft Auto: Vice City* and, 1071
  - narrative games and, 1071
  - *Quake* and, 1072
  - *SimCity* and, 1070–1071
- United Arab Emirates (UAE), **1072**
  - Falafel Games, 1072
  - Imaginations FZ, LLC, 1072
  - *Legend of Zord*, 1072
  - Tahadi, 1072
  - Ubisoft Abu Dhabi, 1072
  - *Wadi Basheer*, 1072
- United Kingdom, **1073–1075**
  - AY-3-8500 integrated circuit, 1073
  - computer, 1074
  - history of video games, 1073–1074
  - LEGO games, 1074
  - mobile and portable games, 1074
  - *MUD*, 1073
  - *Populous*, 1074
  - Sinclair ZX Spectrum, 1073
  - tax policies, 1074
  - video game development, 1074
- United States of America, **1075–1077**
  - character of American video games, 1077
  - crash of 1983, 1076
  - early arcade games, 1075
  - electromechanical games, 1075
  - graphics technology, 1076
  - home computer gaming industry in, 1076
  - Magnavox Odyssey, 1076
  - mainframe games, 1075–1076
  - Microsoft Xbox, 1076
  - MMORPGs, 1076

  NES, 1076
  PONG, 1076
  Spacewar!, 1076
  in video game history, 1075–1077
Universal City Studios, Inc. v. Nintendo Co. Ltd., **1077–1078**
  background and case details, 1077
  decision and damages, 1077–1078
  Donkey Kong and, 1077–1078
  King Kong (film) and, 1077–1078
Unlockable games, **1078–1079**
  in *Animal Crossing*, 1079
  in *Celeste*, 1079
  definition of, 1078–1079
  game demos and, 1079
  minigames as, 1079
  unlockable modes as distinct from, 1079
Unreal Engine, **1079–1084**
  easy-to-use editor, 1080
  Fortnite and, 1083
  history and development, 1079–1080
  launch of, 1080
  Mass Effect and, 1080
  modularity, 1080–1081
  Silicon Knights vs. Epic Games and, 922–923
  technical specifications, 1080
  Unreal Engine 4, 1080, 1082, 1083
  Unreal Engine 3, 923, 1082
  Unreal Engine 2, 1081–1082
  Unreal Engine 2.X, 1082
  Unreal Tournament, 1080–1081
  UnrealScript, 1080
  uses outside of gaming, 1082–1083
  virtual reality and, 1083
Unreal Tournament, 370, 967, 1080–1081
Uruguay, **1084–1085**
  digital literacy education, 1085
  Fight'N Rage, 1084
  game studies in, 1085
  Ghostbusters Division, 1084
  institutional support for video game industry, 1085
  Kingdom Rush, 1084
  Special Investigations Unit, 1084
  video game development, 1084–1085
  video game training and education in, 1085

VAPS. *See* Vintage Arcade Preservation Society
Vector games, **1086–1089**
  Atari games, 1086–1087, 1088–1089

  color graphics in, 1087
  The Empire Strikes Back, 1089
  GCE/Cinematronics games, 1086, 1087, 1088
  GCE/Milton Bradley Vectrex games, 1088
  history and development, 1086–1089
  SEGA games, 1087, 1088
  Vectorbeam games, 1087
Vectorbeam, **1089–1093**
  acquired by Cinematronics, 1092
  Cravens, Bill, and, 1089–1090, 1091
  history and founding, 1089–1090
  Rosenthal, Larry, and, 1089–1091, 1092
  Scramble, 1090–1091
  Space Wars, 1089–1090
  Speed Freak, 1091
  Star Castle, 1092
  Tail Gunner, 1091–1092
Vectrex. *See* GCE/Milton Bradley Vectrex
Video Arcade Preservation Society. *See* Vintage Arcade Preservation Society
Video game literacy, **1093–1096**
  definitions of, 1093, 1094–1095
  Kay, Alan, and, 1094–1095
  ludoliteracy, 1095
  research on, 1094–1095
Video game movies, **1096–1099**
  adaptations of video games, 1096–1098
  Boll, Uwe, and, 1098
  film distribution and, 1098–1099
  game developers' film studios, 1098
  horror movies, 1097
  Lara Croft: Tomb Raider, 1096
  The Last Starfighter, 1098
  movies with video games as focal point, 1098
  Papers, Please, 1097
  Pokémon the First Movie, 1096
  Ready Player One, 1098
  Silent Hill: Revelation, 1096
  Street Fighter, 1096
  Super Mario Bros., 13, 341, 1097–1098
  Tomb Raider, 1098–1099
  Uncharted: Live Action Fan Film, 1097
  varied quality of, 1096–1097
  Warcraft, 1096–1097
Video game museums, **1099–1104**
  in Australia, 1102
  in Estonia, 1102
  exhibition at Musee des Civilisations in Quebec City, *1100*
  in Finland, 1102–1103

  - Game Museum (Nagasaki), 1100–1101
  - German Computerspielemuseum Berlin, 1100
  - in Germany, 1100, 1103
  - history of, 1099–1100
  - Museum of Soviet Arcade Machines, 1101
  - Museum of the Game (California), 1101
  - National Videogame Museum (Netherlands), 1101–1102
  - National Video Game Museum (Texas), 1102
  - National Videogame Museum (England), 1101
  - in Portugal, 1103
  - Retro Video Game Museum (Australia), 1102
  - in South Korea, 1103
  - Strong Museum of Play (New York), 1102
  - in Ukraine, 1103
  - in the United States, 1101, 1102, 1103
  - Video Game Museum of Rome, 1102
- Video game novels, **1104–1107**
  - definition of “novel,” 1104
  - gamer novels, 1105–1106
  - ludic novels, 1104–1105
  - video game novelizations, 1106
- Video game studies, **1107–1109**
  - as branch of media studies, 1107–1108
  - debate between narratologists and ludologists, 1108
  - game history and, 1108
  - history of, 1107–1108
  - traditional game studies and, 1108
- Video games and literature, **1109–1111**
  - digital storytelling, 1111
  - games based on novels, 1111
  - genre exchange, 1111
  - impact of literature on games, 1110–1111
  - impact of video games on literature, 1109–1110
  - interrelations between literature and games, 1111
  - literary experimentation and, 1109–1110
  - novelizations of games, 1111
  - text adventure games, 1110
- Video games as collectibles, **1112–1115**
  - collecting societies, 1113
  - future of, 1114
  - game cartridges as physical artifacts, 1113–1114
  - impact on marketing, 1113
  - nostalgia and, 1112, 1113
  - rarity and, 1113–1114
  - rise of collectibles and collecting, 1112
  - *See also* Vintage Arcade Preservation Society (VAPS)
- Video games within video games, **1115–1116**
  - *Call of Duty: Black Ops*, 1115

  Catherine, 1115–1116
  early examples of, 1115
  Fallout 4, 1115
  nostalgia and, 1116
  Zork I, 1115
Videotopia, **1116–1117**
  arcade games in, 1116
  coin-operated games in, 1116
  entrance to, 1116
  evolution of three-dimensional graphics in, 1117
  laserdisc games in, 1117
  notable “firsts” in, 1116–1117
  purpose of, 1117
Vintage Arcade Preservation Society (VAPS), **1117–1118**
  current mission of, 1118
  history and founding, 1117–1118
  leadership and administration of, 1118
  membership of, 1117
Violence, **1118–1122**
  aggression and, 1119
  definitions of, 11120
  game content and, 1118–1120
  media effects and, 1118, 1119
  rating systems, 1119–1120
  research on video games and, 1119
Virtual Boy. *See* Nintendo Virtual Boy
Virtual pets, **1122–1123**
  Digimon, 1122
  history of, 1122
  Petz series, 1122
  Pou, 566
  Raise: Imaginary Pet, 167
  software toys, 1122
  Tamagotchi, 1122, *1123*
Virtual reality (VR), **1123–1125**
  artificiality and, 1124
  characteristics of, 1124
  definitions of, 1123–1124
  fidelity and, 1124
  hardware, 1124
  history of the term, 1124
  immersion and, 1124
  interaction and, 1124
  presence and, 1124
  VR video games, 1124
  See also HTC Vive; Oculus Rift
Visual literacy, **1125–1128**
  definition of, 1125

  Feldman Method and, 1126
  gameplay and, 1127
  origins of the term, 1125
  skills and advantages of, 1126–1128
  text-based literary and, 1125–1126
Visual novels, **1128–1129**
  definition and characteristics of, 1128–1129
  replaying the game, 1128–1129
  types of, 1129
VR. *See* Virtual reality

Walden, a game, **1130–1131**
  awards, 359
  companion curriculum for, 1131
  Fullerton, Tracy, and, 359
  gameplay of, 1130–1131
  history and development, 1130
  Thoreau, Henry David, and, 359, 1130, 1131
  voice actors in, 1131
Walkthroughs, **1131–1132**
  cheating and, 160, 161, 162
  co-creativity and, 178
  complete walkthroughs, 1131
  critical path walkthroughs, 1131
  definition of, 1131
  deludic play and, 248
  early published walkthroughs, 1132
  game guides and, 374, 376
  Let’s Play videos and, 574
  for linear games, 1131–1132
  for open-world games, 1132
  in Polish computer magazines, 793
  rules and, 879
  on social media, 943, 944
  video, 943, 1166
Wander, 18, 1033
War, **1132–1135**
  board games and, 1133, 1134–1135
  definition of, 1132–1133
  rationalization and, 1133–1135
  video games and, 1135
Warnets, **1135–1136**
  gaming and, 1136
  history of, 1135–1136
  origins of the term, 1136
  purposes of, 1136
  Wifi-Corner service, 1136
Warrior, 51, 173, 339, 467, 1087, 1092

Web-based games, **1137–1138**
  on consoles, 1137
  definition of, 1137
  on handheld devices and cell phones, 1137
  history of, 1137
  media coverage of, 1137–1138
  MMOs, 1137
  on personal computers, 1137
  types of, 1137
Weisbecker, Joyce, **1138–1139**
  first woman to work as commercial video game developer, 1138
  Jackpot, 1138
  Snake Race, 1138
  Speedway, 1139
  Tag, 1139
  TV Schoolhouse I, 1138–1139
West and Zampella v. Activision, **1139–1140**
  background and case details, 1139
  Call of Duty: Modern Warfare 2 and, 1139–1140
  countersuit, 1139–1140
  settlement, 1140
Wii. *See* Nintendo Wii
Wii Sports, **1140–1141**
  as form of resistance, 1141
  history and development, 1140
  packaged with Nintendo Wii, 408, 731
  physical health and, 458
  real-world player space and, 1140–1141
  visual humor and, 1141
Williams (company), **1141–1142**
  crash of 1983, 1142
  Defender, 246–247, 649, 1142
  history and founding, 1141
  Joust, 1142
  Midway Games and, 103, 649, 1142
  Paddle-Ball, 1141–1142
  Robotron: 2084, 1142
  Sinistar, 1142
  Stargate, 1142
Williams, Roberta, **1142–1143**
  The Dark Crystal, 1143
  King's Quest series, 20, 201, 1034, 1143
  Laura Bow series, 1143
  Mixed-Up Mother Goose, 1143
  Mystery House, 19, 1034, 1142–1143
  Phantasmagoria, 1143
  Sierra On-Line and, 918, 1142–1143
Witcher series, 238, 309, 796, 111

Wolf, Mark J. P., 106, 256, 430, 438, 539, 663, 777, 920
Wolfenstein 3D, 106, 117, 159, 159. 262–263, 350, 351, 492, 664, 778, 837–838, 912, 1152, 1153
Woods, Don, 17, 18, 328, 421, 591, 891, 1033
World (of a video game), **1143–1146**
  components of, 1145–1146
  history of, 1146
  inhabitants of, 1145
  operational logic of, 1145–1146
  space of, 1145
World Cyber Games, **1146–1147**
  first WCG event, 1146
  history of, 1146
  revival of, 1146–1147
  WCG Ultimate Gamer, 1146
World of Warcraft (WoW), **1147–1149**
  avatars, 1148
  Blizzard Entertainment and, 1149
  derivative products, 1149
  expansions, 1149
  gameplay of, 1147–1149
  guilds, 1148–1149
  history and development, 1147
  inspiration for, 1148
  screenshot, *1148*
  subscription statistics, 1149
World Video Game Hall of Fame, **1150–1151**
  criteria for recognition, 1150–1151
  A History of Video Games in 64 Objects, 1150–1151
  inductees, 1150
  at Strong National Museum of Play, 1150
World War II in video games, **1151–1155**
  Call of Duty: WWII, 1154
  Close Combat, 1153
  Combat Flight Simulator WWII Europe, 1152
  computer simulations of board games, 1153
  criticism of, 1154
  early examples of, 1151
  flight simulators, 1152
  historical battles, 1153–1154
  1942: The Pacific Air War, 1152
  realism and, 1153–1154
  strategy video games (computer wargames), 1152–1153
  War Thunder, 1152
  Wolfenstein 3D, 1152, 1153
  Wolfenstein II: The New Colossus, 1154
  World at War, 1154
WoW. See World of Warcraft (WoW)

Wozniak, Steve, 74, 75, 476, 977
Wright, Will, **1155–1156**
  early years and education, 1155
  on gaming industry trends, 1155–1156
  Maxis Software cofounder, 611, 612, 1155
  Raid on Bungeling Bay, 1155
  Sim series, 923, 925–927, 1155
  Spore series, 932–933, 1155

XaviXPORT, **1157–1159**
  controllers, 1158
  game library, 1157–1158
  history and development, 1157–1158
  price of, 1158
  SSD Company Limited (SSD) and, 1157–1159
  technical specifications, 1158
Xbox. *See* Microsoft Xbox
Xbox 360. *See* Microsoft Xbox 360
Xbox Game Studios, **1159–1160**
  acquisitions, 1159–1160
  future of, 1160
  history and development, 1159–1160
Xiaobawang system, **1160–1162**
  cloned from Nintendo Famicom, 1160
  development of, 1161
  distribution and marketing of, 1161
  evolution of, 1161–1162
  game cartridges, 1161
  Game Machines Sales Ban and, 1160–1162
  history of, 1160–1162
XNA, **1162–1163**
  history and development, 1162
  XNA development community, 1162, 1163
  XNA Framework, 1162–1163
  XNA Game Studio, 1162, 1163

Yokoi, Gunpei, **1164–1165**
  D-pad, 450
  early years and education, 1164
  Game Boy, 448, 471, 719, 1164
  Game & Watch, 708, 719
  Kid Icarus, 1164
  Koto Laboratory, 1165
  Metroid series, 636, 1164–1165
  Nintendo Ultra Hand, 707
  Nintendo Virtual Boy, 719, 727, 728, 1164–1165
YouTube, **1165–1167**
  acquired by Google, 1166

  - as "cultural archive," 1167
  - features, 1166
  - history of, 1165–1166
  - Let's Play videos, 1166
  - longplays, 1166
  - monetization of video game-related content, 1166–1167

Zagal, José P., 158, 1094, 1095
Zapak (portal), **1168–1169**
  - content partnerships, 1169
  - history and development, 1168
  - Reliance Games and, 1168
  - services, 1168
  - user download statistics, 1168
  - WAP site, 1168–1169

Z-axis depth, **1169–1171**
  - axonometric projections and, 1170
  - depth-obscuring devices and techniques, 1170
  - early games and, 1169–1170
  - pre-rendered three-dimensional imagery and, 1170
  - reduction of render time, 1170–1171
  - sprites and, 1170
  - stereo images and, 1170
  - three-dimensional computing and, 1170
  - z-buffer and, 1170

Zaxxon, **1171–1172**
  - dimensionality in, 258
  - gameplay, 1171–1172
  - isometric graphics in, 40, 440, 1172
  - reception, 1172
  - written instructions in, 461

Zeebo, **1172–1173**
  - as educational platform, 1172–1173
  - history and development, 1172
  - reception and sales, 1172

Zelda series. *See Legend of Zelda, The* series
Zen Mode, **1173–1174**
  - defining characteristics of, 1173
  - *flOw* and, 1173
  - immersion/flow and, 1173
  - *Journey* and, 1174
  - minimalist aesthetic and, 1173
  - Zazen (sitting meditation) games, 1174
  - Zen gaming and, 1174

Zimmerman, Eric, 27, 108, 363–364, 584, 785, 786
Zircon Channel F. *See* Fairchild/Zircon Channel F
Zork series
  - for Apple Newton MessagePad, 1048

  - *Beyond Zork*, 513
  - in history of shareware games, 909
  - in history of text adventure games, 1033, 1110
  - Infocom and, 511–512, 513
  - *Legends of Zork*, 513
  - in list of most important digital games of all time, 335
  - metalepsis in, 628
  - metatextuality in, 634
  - nondimensional games and, 260
  - *Return to Zork*, 513
  - video games within video games, 1115
  - *Zork* (mainframe game), 511–512, 591, 634, 1033
  - *Zork: Grand Inquisitor*, 513
  - *Zork Nemesis*, 513
  - *Zork I*, 1048, 1115
  - *Zork II*, 1033
  - *Zork* Zero, 513
- Zynga Inc., **1174–1176**
  - *Café World*, 1175
  - corporate culture, 1175
  - corporate headquarters, 1175
  - *Dream Heights*, 1175
  - Facebook and, 1174–1176
  - free-to-play model, 357
  - history and founding, 1174
  - *Mafia Wars*, 1174, 1175
  - Pincus, Mark, and, 1174, 1175–1176
  - *Zynga Poker*, 362, 1174
  - *See also FarmVille*